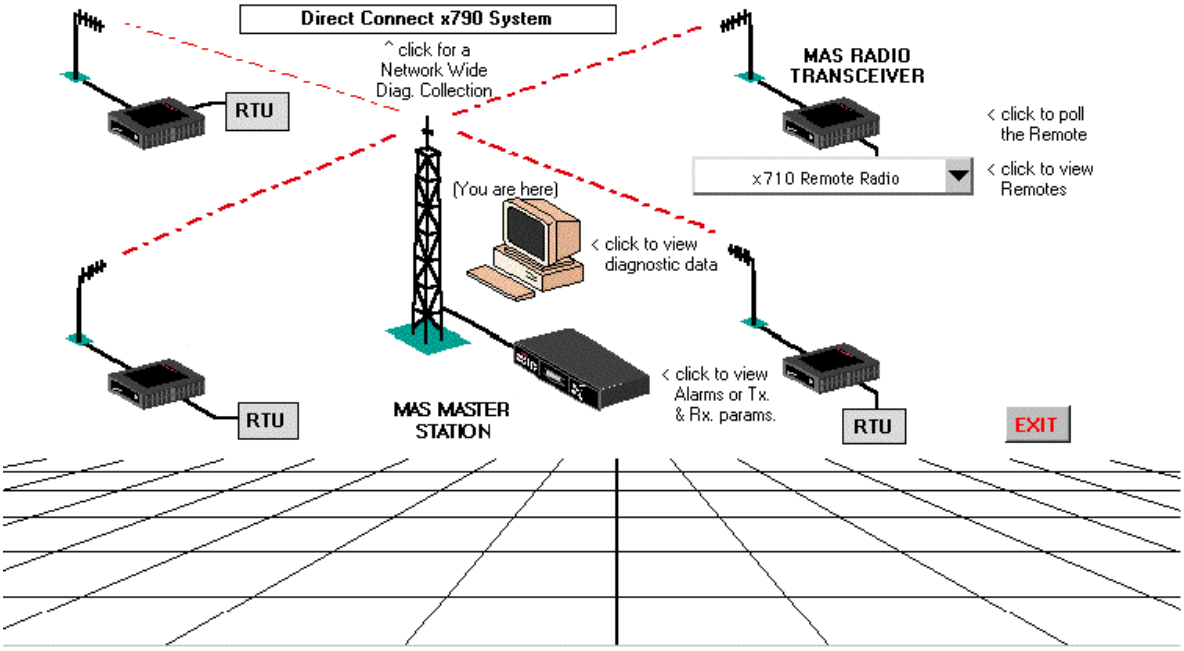
InSite™ 6

RADIO SYSTEM MANAGEMENT SOFTWARE



MDS 05-3696A01, Rev. A
NOVEMBER 2000

Microwave Data Systems Inc.

Installation and Operation Guide

InSite™ 6 Quick Start

1. Check computer and radio equipment for compatibility with InSite (Page 4).

- InSite 6 or greater supports SVGA (800 x 600) resolution displays on 32-bit Windows platforms (95, 98, ME, NT or 2000). An older version (InSite 5) is available for Windows 3.1 or 3.11 systems (MDS P/N 03-2716A01). In addition, a DOS-based program called *MDS 2000 Diagnostics and Control System Software* is available. **All of these versions are contained on the InSite 6 CD.**
- InSite 6 is for DSP-based, Network-Wide capable radios or LEDR II wideband point-to-point radios manufactured by MDS. InSite 5 and the DOS-based MDS 2000 program are for older MDS products that use DTMF-signaling for diagnostics.

2. Install the InSite program (Page 6).

- A single CD is supplied in this manual that includes all necessary program files.
- Insert the disk and follow the on-screen prompts and dialog boxes to install the program in the desired directory. (The default directory is **C:\INSITE**.)
- When installation is complete, the InSite icon appears on the screen.

3. Connect the PC to the radio (Page 8).

- For direct connection to a master station (most common arrangement), connect an RS-232 cable between the PC and the radio's DIAGNOSTIC port. (On LEDR II radios, connection is made to the front panel CONSOLE connector.)
- See this manual for other connection methods (code-operated switch, modem, Internet, etc.).

4. Load an existing Equipment List (or create a new one—see Page 46).

- Equipment lists are the basis for all diagnostic polling. A list must be created before any polling can begin.
- Select **Configure>>Equipment Lists** from the main menu or NetworkView screens. A number of sample equipment lists are built into the InSite program, which can be edited as necessary to create a new list.
- Be sure to **Save** the equipment list before exiting the screen.

5. Select a system to view/configure from the NetworkView screen (Page 18)

- Launch InSite, then select **NetworkView** from the Network-wide drop down menu or...

  Launch InSite with passwords enabled. (Passwords may be set from the **Configure>>System Settings** screen.)
- With the desired system name displayed on the NetworkView screen, click the system icon to view the system layout. From here, you can click on the PC for diagnostic data for the *entire system*, or you can click on one of the radios in the system to poll a *particular unit*.
- Many additional polling modes and viewing options are available. Consult this manual and the online help (accessible from all screens) for details.

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MDS Quality Policy

We, the employees of Microwave Data Systems Inc., are committed to understanding and exceeding our customer's needs and expectations.

- We appreciate our customer's patronage. They are our business.
- We promise to serve them and anticipate their needs.
- We are committed to providing solutions that are cost effective, innovative and reliable, with consistently high levels of quality.
- We are committed to the continuous improvement of all of our systems and processes, to improve product quality and increase customer satisfaction.

Notice

While every reasonable effort has been made to ensure the accuracy of this manual, product improvements may result in minor differences between the manual and the product shipped to you. If you have addi-

tional questions or need an exact specification for a product, please contact our Customer Service Team using the information at the back of this guide. In addition, manual updates can often be found on the MDS Web site at **www.microwavedata.com**.

1.0 INTRODUCTION

Welcome to the latest version of MDS InSite™ software (MDS P/N 03-3533A01). This software is a valuable tool for monitoring the status of MDS radio systems and making configuration changes in the convenience of an office setting (or from any station in the network—master, repeater or remote) using InSite's Network-Wide capability.

InSite monitors system performance and diagnoses communication problems due to the radio, RTU, primary power or transmission path. Often, it is possible to detect minor problems and correct them before they become a threat to network operations. If a trip to a remote site becomes necessary, technicians will often have a good idea of what the problem is and can prepare for it accordingly. Additionally, InSite 6 can be used to determine if the problem exists in the radio or the RTU and attempt to clear an RTU fault by resetting it from the central facility.

InSite's enterprise connectivity allows system administrators and technicians to be alerted to alarm conditions at any time, even when personnel are away from the diagnostic computer. This capability may be used to send alarm messages via e-mail or to Internet-capable pagers.

NOTE: Although InSite provides valuable assistance in monitoring the performance of radio systems, it is not intended to be a substitute for calibrated test equipment.

1.1 About this Manual

The program's features—many of which are new to InSite 6—are fully described in this Installation and Operation Guide. A review of this information will help ensure successful use of the software with your MDS radio system.

NOTE: An online (Adobe® PDF) version of this Guide is included on the InSite CD. The PDF version allows searching for specific terms and provides "hot links" that can be clicked to display a particular topic. The content of this printed manual and the PDF version are identical.

The Installation and Operation Guide contains the following sections:

Section 1.0, *INTRODUCTION* (beginning on page 1)—Provides an overview of this manual, and explains the new features that have been added since the last release of the program.

Section 2.0, *INSTALLING INSITE* (beginning on page 4)—Discusses computer requirements, installing the software, and how to connect the diagnostic computer to your radio system.

Section 3.0, *SOFTWARE OVERVIEW* (beginning on page 15)—Explains how to launch the software, describes how InSite 6 communicates with radio systems, and provides a brief tour of the main program screens.

Section 4.0, *NETWORK-WIDE DIAGNOSTICS* (beginning on page 23)—This section explains the principles behind network-wide diagnostics and provides a screen-by-screen tour of the related screens and features.

Section 6.0, *WORKING WITH EQUIPMENT LISTS* (beginning on page 46)—Equipment lists are a key part of InSite's operation, and this section explains how to set one up that will meet the needs of your radio system. An equipment list must be created before any diagnostics can begin.

Section 7.0, *UTILITIES & SPECIAL INSITE FUNCTIONS* (beginning on page 58)—Explains how to set or change program defaults, configure special functions, and use InSite's terminal command mode. Also offers tips and suggestions for using InSite diagnostic data in other programs, including ODBC and DDE functions, as well as charting and graphing programs.

1.2 What's new in InSite 6?

A major difference between InSite 6 and previous versions of the program is that this version is intended *specifically* for newer generation MDS radios supporting network-wide diagnostics. If you've used a previous version of InSite, a review of this section will familiarize you with the major changes that have been made.

Alarm Mask Programming for External Triggering

InSite 6 now allows the user to specify which alarms cause external triggering. These settings may be made from the Network-Wide Radio Configuration screen explained on Page 32.

Automatic Radio Search

The program has a new Radio Search screen that can *automatically* generate a new equipment list. The complete range of default unit addresses from 0000 to 9999 can be searched in about 30 minutes. The results of the search can be added to a new equipment list or an existing one. Complete details for generating equipment lists begins on Page 49.

Connection via Code-Operated Switch (COS)

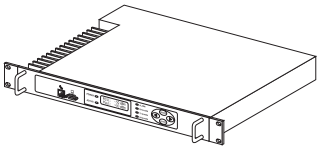
InSite 6 has new support for using a Code-Operated Switch (COS) to connect a PC to several co-located master radios. This support helps to reduce the addressing problem on the Diagnostic Port when a remote radio transceiver is used as a master station. This solution does *not* work

when the MAS master radios are not co-located, as in an extended microwave backbone. The COS feature is built into the MDS x790 Master Station family. COS operation is discussed in detail beginning on Page 9.

Dial-Up Networking

This feature allows for TCP/IP connections and for SMTP e-mail notification of alarms via dial-up telephone line instead of a dedicated LAN. It makes use of the Windows® Dial-Up Networking (DUN) feature. A full description of this capability is given on Page 13.

LEDR II Compatibility



InSite now provides complete support for Microwave Data Systems' LEDR II Series of point-to-point digital radios. Connection to the radio is made at the front panel RS-232 CONSOLE port. Diagnostic parameters can be retrieved and the radio can be configured using drop-down menus.

Any radio on the LEDR II "group" can be accessed by InSite using a simple point and click feature. The user need not have knowledge of LEDR's remote login (**rlogin**) commands to gain access. See Page 41 for more information on using InSite with LEDR II radios.

Network-Wide Diagnostic Collection

The Network-Wide Alarm Collection screen has been renamed the Network-Wide **Diagnostic** Collection screen. In addition to collecting Alarm Status as before, the following items can now be retrieved *non-intrusively:* RSSI, SNR, Supply Voltage, Regulator Voltage, Temperature, TX Power, and MDS 9810 Analog Input. A complete explanation of this screen begins on Page 37.

MDS 9810 Analog 1 Input Monitoring

This new item on the Diagnostic Collection screen (Page 37) monitors the MDS 9810 analog input level from 0-5 volts on Pin 24 of the radio's DB-25 INTERFACE connector.

ODBC Configuration Parameters

This new text box on the System Settings screen (Page 58) allows users to add their Login Usernames and Passwords to SQL Server databases that reside on a network. Several field names and table names have been changed to eliminate conflicts with reserved keywords in Microsoft® SQL Server.

Over-the-air Radio Configuration

InSite 6 provides the capability to observe and configure several important radio parameters over the RF link (for example: power output, device type, time-out timer delay, data rate/format, etc.). The specific settings that are available will change depending on the radio model being configured. Radio configuration is accomplished from the Network Wide Radio Configuration screen, explained on Page 32.

Quick Alarm Status "Ping"

A Quick Alarm Status Ping feature has been added to the Network-Wide Diagnostic Collection screen (Page 37) under the **Radio Polling Mode** menu. When a radio does not respond to a diagnostic poll, it can now be quickly determined (in less than half a second) if the radio or RTU/PLC is at fault by intrusively testing the radio for alarms.

Sleep Inhibit Mode

At many solar-powered sites, power consumption is kept to an absolute minimum by placing the equipment in a "sleep mode" until communication is required. In these cases, the radio must be "woken up" to conduct diagnostics. The Sleep Inhibit mode accomplishes this so that InSite can gather data from the station. After data collection, the radio returns to sleep mode. Refer to Page 31 for details.

2.0 INSTALLING INSITE

The installation of InSite involves two main tasks:

- Installing the software from the CD-ROM (or from downloaded disk images) onto a PC
- Connecting the PC to the master station's diagnostics port (physically, or indirectly via modem, COS, or other link)

2.1 Installation Requirements

InSite is a 32-bit program designed to run on computers equipped with Windows® 95, 98, ME, NT, or 2000 operating software.

Earlier versions of InSite, designed for earlier operating systems and computer platforms (including DOS), are also available on the InSite CD. Note that these earlier versions do *not* support Network-Wide diagnostics.

Computer System

Besides the Windows® operating system, the computer must include a hard drive with adequate memory space for running and

storing the program resources. Table 1 lists the preferred and minimum computer requirements.

Table 1. Computer System Requirements

System Item	Preferred	Minimum
Processor	166 MHz or faster Pentium® processor	75 MHz Pentium® processor
Operating System		Microsoft® Windows® 95, 98, ME, NT or 2000
Memory (RAM)	64 Megabytes (MB)	32 MB
Video	SVGA (800 x 600) high-color 16-bit display	256 colors—Some degradation in display quality will result
Sound	Sound card desirable (for alert sounds)	
Hard Drive Space		25 MB for program operation
CD-ROM Drive	Required. (Used for initial installation of the program.)	

NOTE: InSite is designed to work with Windows® standard small fonts. Large fonts are not fully supported by the program. To check or change your computer's display fonts, select **Start>>Settings>>Control Panel**, click on the **Display** icon, then select the **Appearance** tab.

Modems

A modem is required when connecting your PC to the master station remotely, such as by telephone line or other audio circuit. While most Hayes™-compatible modems will work, the units listed below have been tested with InSite and are recommended for use with the program:

- Hayes® Accura 14.4 kbps modem
- Cardinal Connecta™ 56 kbps modem
- US Robotics® Courier HST 14.4 kbps modem
- Practical Peripherals® 14.4 kbps modem (PM14400FXSA)
- Zoom® AMX 2400 bps modem
- IBM ThinkPad® internal modem
- Xircom PCMCIA modem

Radio Equipment

Radios used with InSite software must be MDS brand and be properly configured for diagnostics. Below are the general requirements for master, remote and point-to-point stations.

NOTE: InSite 6 supports newer MDS radio products that employ DSP-based microprocessors and have network-wide diagnostic capability. For earlier (DTMF-based) radios, **InSite 5** is suggested. This earlier program is included on the CD along with an online (PDF) manual for installation and operating details.

Master Stations and Remotes

MDS 4790 and MDS 9790 Series master stations and MDS 2710, 4710, 9710, 9810 Series remote stations (except "B" models) are compatible with InSite 6 *provided Network-Wide Diagnostics has been enabled*.

Network-wide diagnostics is an option for these radios, and may or may not have been purchased for a particular radio. Use the **OPT!** command from a connected PC to see whether a diagnostics option has been purchased for a radio ("**DIAGNOSTICS: ON**", as in Figure 1). See the radio's Installation and Operation Guide for details.

Diagnostics capability can be added to a radio that was not originally shipped with this feature. For information on how to do this using InSite, see Section 4.3, *Authorizing a Radio for Diagnostics* (beginning on page 35).

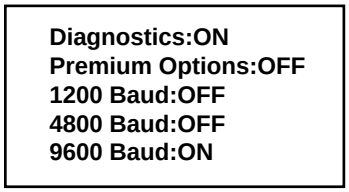


Figure 1. Example Response to OPT! Command
(for MDS x790 and MDS x710 Radios)

Point-to-Point LEDR II Radios

InSite 6 can be used with MDS LEDR II radios (LEDR 400, 900 and 1400 Series). This capability is built into all LEDR II radios and there are no requirement for special options or additional software.

2.2 Software Installation

InSite can be installed from an MDS-supplied CD or by disk image files downloaded from the MDS web site (www.microwavedata.com). With either method you'll be installing the following:

- A file called **Setup.exe**, which launches the InSite installer
- InSite software files (InSite 6, plus earlier versions)
- InSite on-line help file, **insite.hlp**
- InSite user's manual, ***xxxxx*.pdf**
- Adobe® Acrobat® Reader (for viewing or printing the online version of this manual—optional installation)

Installing InSite 6 from the CD-ROM

To install InSite from a factory-supplied CD-ROM follow these steps:

1. Insert the CD-ROM disk in the CD-ROM drive.

2. When the first InSite screen appears, click on **INSTALL SOFTWARE**.

3. At the next screen click **Install MDS SCADA Diagnostics** (or other desired package).

4. At the first InSite Setup screen (Figure 2), click **Install InSite 6**. This presents the destination screen (not shown here) where you can specify the directory where InSite will be installed.

   The default directory is **C:\INSITE**. If this location is acceptable, click **Finish**. If not, choose **Change** and follow the instructions to change the name.

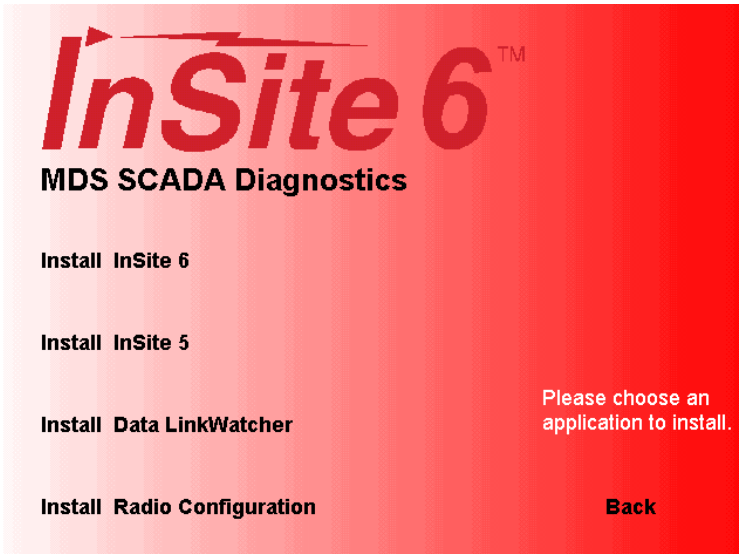


Figure 2. InSite Setup Screen

NOTE: When installing InSite on a Windows® NT computer, you must transfer the on-line help file (**insite.hlp**) and Installation and Operation Guide file (***xxxxx*.PDF**) to a Windows® directory. This directory may need to be created in Windows® NT before it can be transferred.

5. Follow the remaining prompts and dialog boxes to finish the installation. When the installation is complete, the InSite program icon appears on the screen.

From the Internet

The InSite program may be downloaded via file transfer protocol (FTP) from the MDS web site at **ftp.microwavedata.com**. There are several elements of the program that are required for installation. Once all elements have been transferred to your computer, double-click the **Setup.exe** file to begin the installation.

2.3 Connecting the PC to the Radio

NOTE: For connection to LEDR II Radios, see Page 41.

The PC on which InSite is installed must be connected to one of the radios in the communications system in order to request and receive diagnostic data. Most commonly, this connection is made at the master station, but it may be made at *any* network-wide capable radio in the enterprise.

If the PC and radio are nearby (within 50 feet/15 meters), the connection can be made directly, using an RS-232 cable. When the PC and radio are widely separated, the connection can be made indirectly, using modems at each end of the link, or via a TCP/IP connection over a network or the Internet. Each of these methods are explained below.

Network-wide capable radios are shipped from MDS with the default **DLINK** (Diagnostic Link) baud rate set to **19200** bps. The speed can be changed if necessary; refer to the radio's Installation and Operation Guide.

Direct Connection Method #1—RS-232 Cable

In the simplest arrangement, the diagnostics computer is located in the same room as the radio to be connected, or is within 50 feet/15 meters. The computer's RS-232 port can then be directly connected to the DIAGNOSTICS connector at the rear panel of the master station, using a standard cable. An example of this arrangement is shown in Figure 3.

Depending on the radio model, the diagnostic port may be a 9-pin, DB-style or RJ-11 modular connector. Consult the radio manual for connector information, including pin assignments.

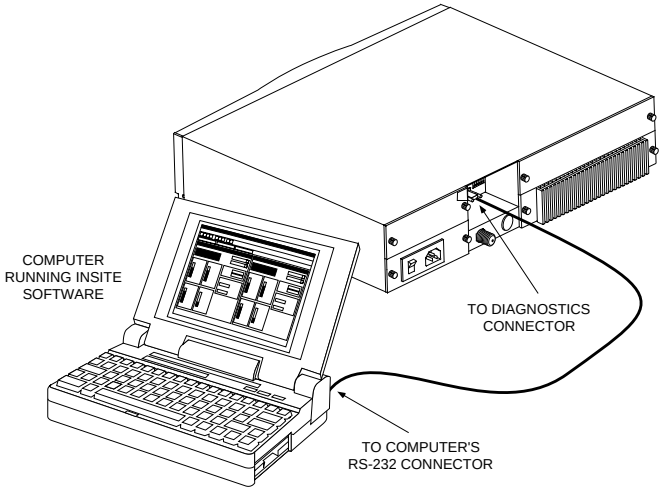


Figure 3. Direct Connection to Radio
(MDS x790 shown—LEDR uses front panel CONSOLE connector)

Direct Connection Method #2—Via Code Operated Switch

Another method of connecting to the radio system is via a code-operated switch (COS). This method is useful in "multi-drop" systems where a single diagnostic computer is to be used with two or more co-located radios sharing a common line as shown in Figure 4. (This method is *not* intended for use in systems where the radios are not physically connected, such as in microwave backbone arrangement.)

A code-operated switch responds to a specific "arming code" that opens one port at a time to connect to the desired radio system. A COS connection may be established in one of two ways:

- Using the built-in COS feature inside MDS x790 master stations (version 1.7 or higher firmware)
- With an external COS device (typically used when two or more remote transceivers are serving as master stations).

Built-in COS (With an MDS x790 Master Station)

MDS x790 master stations equipped with version 1.7 or higher firmware contain a built-in COS that need only be programmed with a proper address to be used with InSite (version 6.3 software or higher). Instructions for addressing a built-in COS follow:

The MDS x790 master station employs a command called **MADDR** (Multi-drop Address). This command is appended with an address that can be set from **1** to **255** to **NONE**. When set to a particular address (e.g., **MADDR 001**) the master station will not accept diagnostic messages until it has first received the Arming Code (~001). Once the Arming Code has been received, the master station stays active to diagnostic messages until another Arming Code is received (e.g., ~002).

Unlike external COS devices that always leave one of the ports enabled and ignore non-matching Arming codes and addresses, the MDS x790 will disable when any non-matching Arming address is received as long as the Arming code is a ~ (tilde).

As shown in Figure 4, Arming codes of ~100 to ~199 can be used to control 100 different master stations and set the external COS devices to Port 1. Assuming that Port 1 on the external COS is left unused, no conflict will occur. When using Arming codes ~2, ~3, or ~4 the external COS device will be enabled and the MDS x790 master stations will be disabled for diagnostics.

External COS Device (Used with a Remote Transceiver)

When multiple remote transceivers such as the MDS x710 Series are to be used as master stations, an *external* COS is required. Although external COS devices are available from a number of manufacturers, InSite 6 was specifically tested with a COS-4 switch manufactured by Black Box® Corporation. Figure 4 and the text that follows explains the setup of this model. The setup of other COS brands will be similar—Refer to the documentation supplied with the COS for additional information.

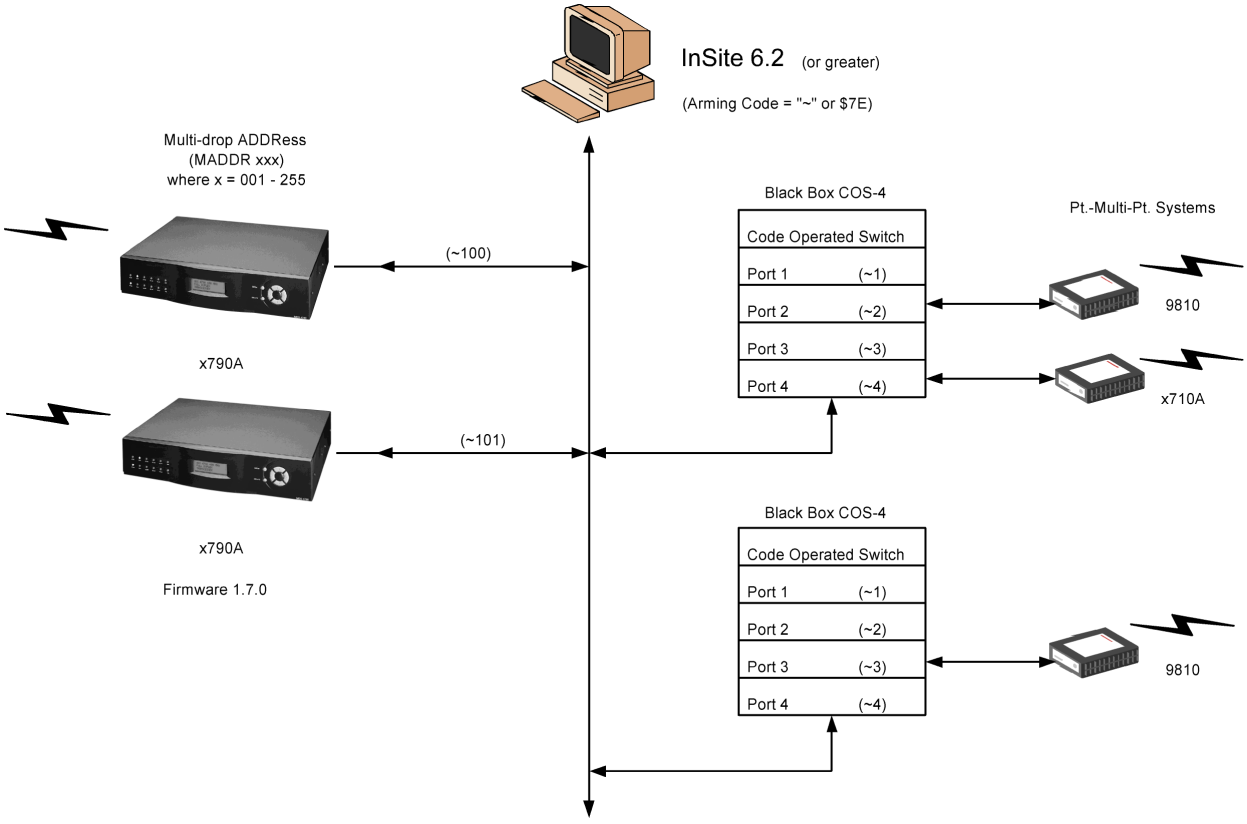


Figure 4. External Code-Operated Switch (COS) Arrangement
(Showing a mix of MDS x790s and remote radios serving as masters)

To set up the Black Box® COS-4 to operate with an MDS transceiver, follow these steps:

1. Remove the six screws (three on each side) from the cover of the COS. (This does not void the warranty.)

2. Set the switch behind the COMMON port to DTE (switch to letter B).

3. Set any radio connected from a port to DCE (switch to letter A).

4. Locate the two DIP switches. Set SW11 as follows: 1, 2, 7, 8 ON, 3 through 6 OFF. This sets the communication parameters to 19,200 kbps, 8 data bits, no parity, normal operating mode, and 500 milli-second pause for graphics mode.

5. Set SW12 as follows: 1 and 8 OFF, 2 through 7 ON. This sets the arming code to ~ (tilde) which is a $7E ASCII character. The tilde character is used because it's not used in any network-wide diagnostic messages.

6. On the front panel, set the operating mode (switch under the letters TX GR TR) to graphics mode (GR). This enables the pause between switching so that if the user had entered a ~ somewhere, it does not get confused between a switch and a non-switch.

7. Test the COS for proper operation. If it works properly, re-install the top cover.

NOTE: To use a COS with a modem, the procedure is identical, except that InSite dials the modem connection first and then sends out the arming code after the modem link has been established.

Indirect Connection Method #1—Modem

If the diagnostics computer is located a long distance from the master station/point-to-point radio, a modem connection is recommended. In this arrangement, an audio circuit (telephone line, 2-wire/4-wire twisted pair, or microwave link) is established between the computer and the radio, and a modem is installed at each end of the link (Figure 5).

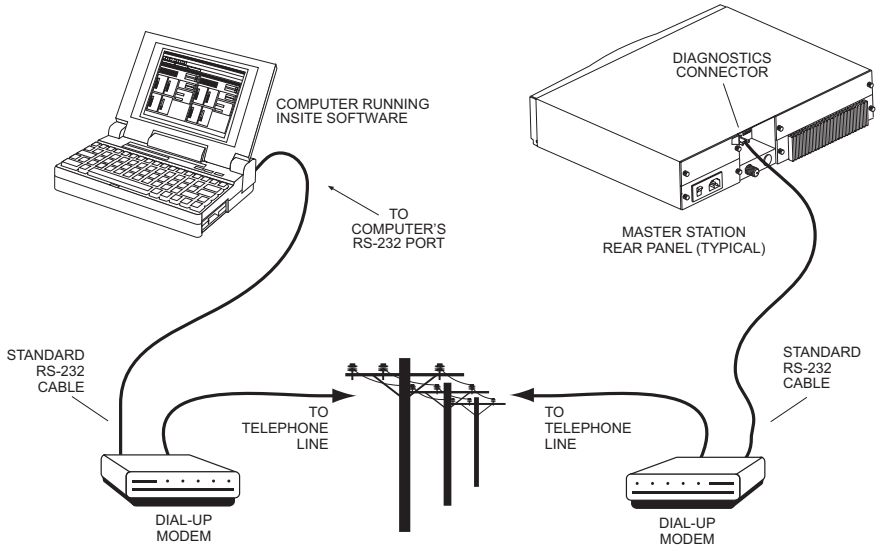


Figure 5. Connection to Radio via Modem

Indirect Connection Method #2—Internet Access (TCP/IP) via Remote Access Server

Network-wide diagnostics information can be accessed over an area network or the Internet using a Remote Access Server (RAS), as shown in Figure 6. The RAS will serve as a media converter from a serial port (RS-232-type) to an Ethernet multi-drop interface. The RAS will also convert the serial protocol to a TCP/IP protocol suitable for Internet connectivity. Contact MDS for additional information on configuring the Remote Access Server.

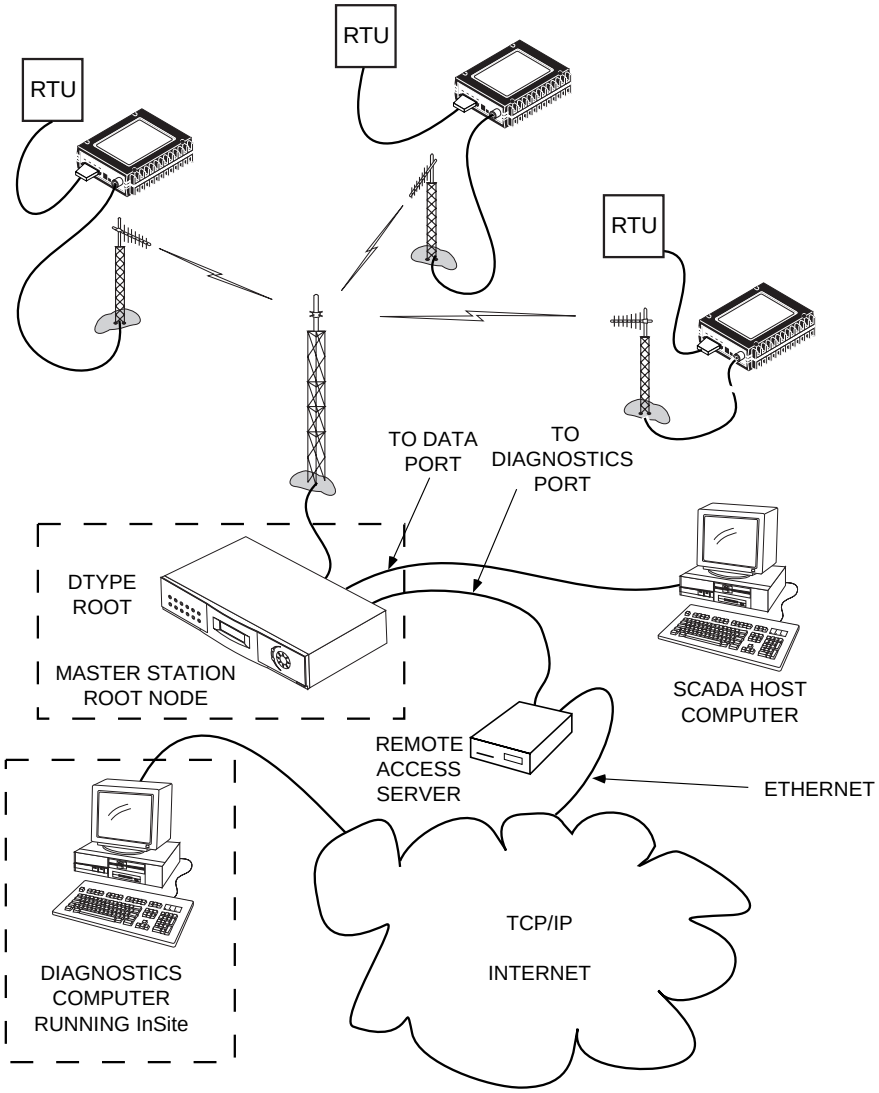


Figure 6. Network-Wide Diagnostics Served Over the Internet

Indirect Connection Method #3—Dial-Up Networking (TCP/IP) via the Internet

A Dial-Up Networking feature allows InSite to connect to a specific ISP (Internet Service Provider) when needed. You no longer need to have a LAN connection to connect to a radio system via TCP/IP. InSite also has a “disconnect when idle for xx minutes” feature which will disconnect you from the Internet if no radio activity has occurred during a specified period (1 minute to 10 hours as set in the System Settings screen.) The programmable disconnect setting can be used to increase the efficiency of the dial-up feature by reducing the connection time and the calling frequency.

Follow these steps to set up Dial-Up Networking on the diagnostics computer:

1. Double-click on **my computer** and then double-click on **Dial-Up Networking**. If you have a Dial-Up Network Connection already made, proceed to Step 2. Otherwise, run the **Make New Connection** wizard.

2. In the Windows® Explorer window, go to the **Connections** menu item and click **properties**. In the properties box, be sure that **Prompt for information before dialing** is un-checked. Then click **OK**.

3. Place a short-cut of the Internet connection into the InSite directory. Rename it to **dialup**.

4. Verify that the program **Hangup.exe** is also in the InSite directory. This file is automatically placed in the application directory (normally **\insite**) during the installation of the InSite program. From here, you will be ready to start Dial-Up Networking.

NOTE: Be sure to set the button in the System Settings screen to **Dial-up**, and not **LAN**, otherwise connection to the Internet will not be made.

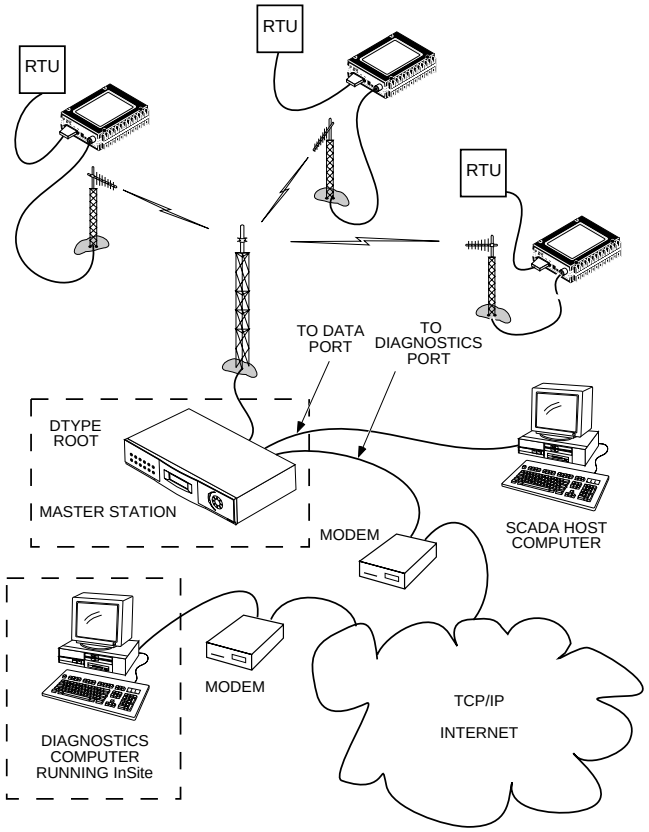


Figure 7. Dial-Up Networking Connection via the Internet

3.0 SOFTWARE OVERVIEW

InSite™ Radio System Management Software allows network-wide control and monitoring of multiple address (MAS) master stations, remote radios, repeater stations, and point-to-point radios using a personal computer. (Unless otherwise specified, the term “master station” in this guide includes MAS master stations, repeater stations, and point-to-point radios.)

InSite software includes many features that make it easy to implement in new or existing radio systems. Its main features include:

- **Built-in RTU Simulator—**Can be enabled from InSite on any radio in the network to verify RF link quality and radio configuration. The data polling to the RTU Simulator is provided by other MDS applications such as LinkWatcher, RSIM, and POLL.EXE.
- **Network-wide Radio Configuration—**Many remote radio parameters can be configured over the RF channel.
- **Non-intrusive Alarm and diagnostic Polling—**Continuous or scheduled alarm polling that does not interrupt user (payload) data.
- **Alarm Notification—**E-mail or pager notifications using SMTP.
- **Graphical Display of Alarm Data—**Color keyed boxes with a point and click feature to view alarm details or add new radios.
- **On-line help—**“Pop-up” help from within the program, plus this manual in PDF format.
- **Enterprise Connectivity—**InSite supports three levels of connectivity; ODBC for routing diagnostic data to local or remote databases, Dynamic Data Exchange (DDE) server for sharing data with other applications on the same computer or across a network, and TCP/IP using a remote access server.
- **Automatic Radio Search—**Equipment lists can be created by searching up to 10,000 radios in 30 minutes.

3.1 Basic Diagnostic Communications Modes

There are two radio diagnostics communications modes:

- Network-wide diagnostics
- DTMF diagnostics

Network-Wide Diagnostics Communications

Network-wide diagnostics communications is a modern, packetized mode that has several advantages over DTMF diagnostics communications:

- Diagnostic data can be gathered over a large radio network without disrupting system communications flow.
- When required, diagnostics communications speed can be increased by actively collecting diagnostic data.
- Diagnostic data for each radio in the network can be accessed from any radio diagnostics port in the network.
- Certain messages can be broadcast to all radios in the system simultaneously.

Most MDS radios of recent manufacture use network-wide diagnostics communications. These products include the MDS x810 and x710 Series, x790 Series, and the LEDR II Series.

For an in-depth look at the network-wide features included with InSite 6, refer to Section 4.0, *NETWORK-WIDE DIAGNOSTICS* (beginning on page 23).

New users should also refer to the *Network-Wide Diagnostics Technical Manual* (P/N 05-3467A01). It contains valuable system-level information on this type of diagnostic communication. This manual is included (in PDF form) on the InSite CD and is installed with InSite 6 under the InSite RSMS group in the Windows® Start menu.

DTMF Diagnostics Communications (InSite 5 only)

Formerly, MDS provided a diagnostic system that used DTMF tones to communicate diagnostics information across the radio network. Although reliable, the tones would interfere with regular radio traffic ("payload" data), and the throughput of information was limited.

Radios that commonly used DTMF diagnostics communications include the MDS 1000, MDS x310, MDS 2100, and MDS 4100, as well as backward-compatible radio models such as the MDS 9710B and 4710B.

InSite 6 does not support DTMF diagnostics, however, InSite 5 is also included on the CD and fully supports this mode. Refer to the online manual included with InSite 5 for user instructions.

3.2 Software Start-up

To start InSite, select it from the Windows® **Start >> Programs** menu. After the program loads, you will see the NetworkView screen (Figure 8), if passwords are enabled; or the Main Menu screen (Figure 9), if passwords are disabled. The NetworkView screen presents a graphic depiction of your radio system; the Main Menu screen presents a menu of screen choices.

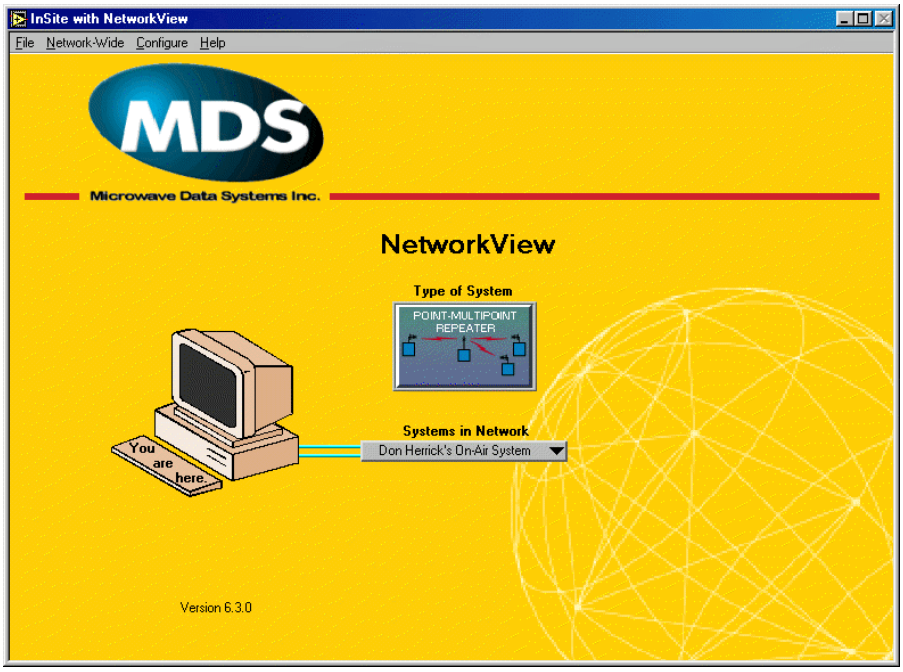


Figure 8. NetworkView Master Station Selection Screen

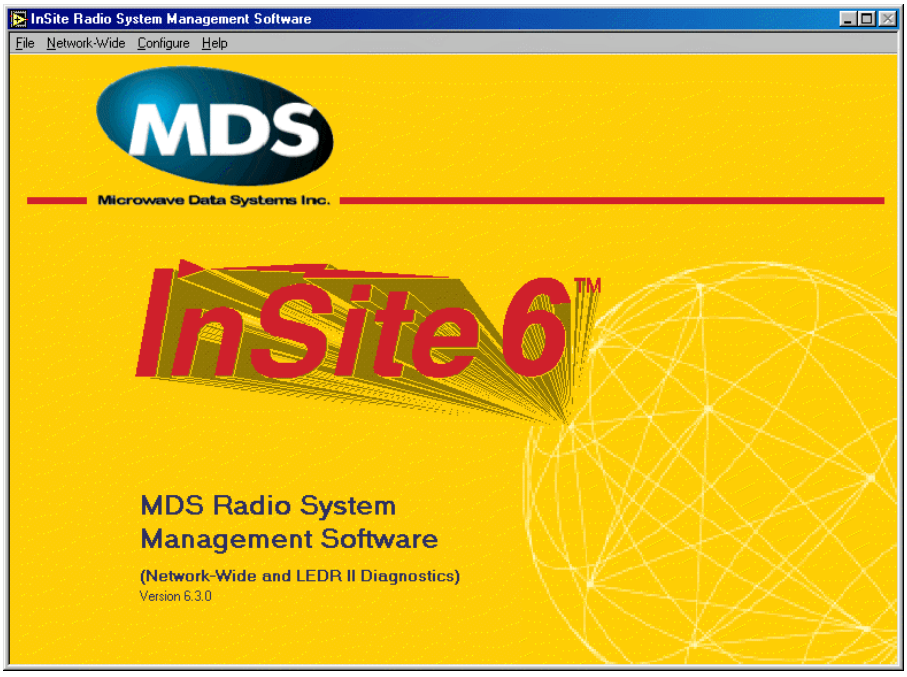


Figure 9. Main Menu Screen

Equipment Lists

An equipment list must be established before diagnostics or configuration can begin. An equipment list is a database of information on radios in a system; it configures polling options for diagnostics and sets up the NetworkView screens. Until you create a list, InSite loads the *Default Equipment List*, **DEFAULT.EQU**, which provides basic functionality for most types of systems (see "WORKING WITH EQUIPMENT LISTS" on page 46 for more information on setting up a list.

Password Access

If system security is a concern, you may want to enable passwords. When passwords are enabled, InSite displays a graphical user interface that makes it easy for inexperienced users to perform diagnostics, while preventing access to the system setup and equipment list screens. Experienced users, however, can navigate directly to the screen they want, create or edit equipment lists, and change system settings. For more information, see "Set or Change Program Defaults (System Settings Screen)" on page 58.

3.3 Main Screen Tour

This section describes the main InSite screens and program flow.

NetworkView Screens

To display, do one of the following:

- Launch InSite, then select NetworkView from the Network-wide drop-down menu or...

- Launch InSite with passwords enabled.

NetworkView is a graphical user interface (GUI) for selecting and displaying diagnostics information on a variety of radio systems and radio types. The graphic display changes based on the selected radio system.

The first NetworkView screen displayed (Figure 8) is for selecting a master station and its associated radios ("radio system"). Basic radio system configurations are:

- Point-to-Point, Licensed
- Point-to-Multipoint, Licensed
- Point-to-Multipoint, Unlicensed
- Point-to-Multipoint, Repeater

A drop-down menu lists all the master stations (or other connected radios) in the current equipment list.

Select a master station from the drop-down menu, then click on the **Type of System** icon to display the second NetworkView screen (Figure 10). This displays a simplified diagram of the radio configuration chosen on the first screen.

- Click on the **PC** icon to view diagnostic data for the entire system.
- Click on the **Master Station** icon to poll the master station.
- Select a radio from the drop-down menu, then click on the **Radio** icon to poll the selected radio.
- Click on the System Name box to perform a diagnostic collection on the entire system.
- Clicking on **EXIT** returns you to the NetworkView screen for selecting a master station.

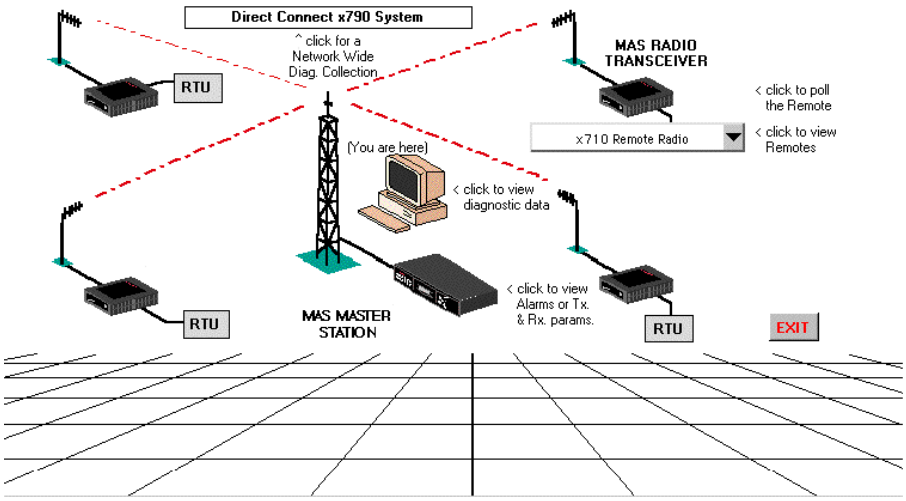


Figure 10. NetworkView Radio System Screen
(MAS point-to-multipoint systems)

Main Menu

To display the main menu screen:

- Launch InSite with passwords disabled, or
- Click **Exit Screen** from the NetworkView master station selection screen.

The Main Menu screen is shown in Figure 9 on page 17. Like the NetworkView screen, the Main Menu provides a menu bar for directly selecting a screen to display. More experienced users can use this screen's menu bar to go directly to a specific screen.

Menu Bar Items

The menu bar lists the following screens and program functions:

Table 2. Menu bar items

Menu bar item	Availability*	Submenu item
Network-Wide	M, N-W	Diagnostic Polling (described on Page 24)
	M, N-W	Diagnostic Collection (Page 37)
	M	NetworkView (Page 18)
Configure	M, N-W	Equipment Lists (Page 47)
	M, N-W	System Settings (Page 58)
Help	M, N-W	On-line Help (Page 20)
	M	About (Page 22)
	M	Terminal Mode (Page 64)

*M = Main Menu screen, N-W = NetworkView screen

On-line Help

To display:

- Select **Help>>On-line Help** from the NetworkView or Main Menu screen, or
- Select **Help>>About** to display the About InSite pop-up window, and click the **Help** button in this window.
- Put the mouse cursor on a screen item (button, text entry field, etc.) and click the right mouse button. Choose Online Help.

An example of online help is shown in Figure 11. Online help includes a table of contents, glossary, and index as well as procedures and detailed screen references.

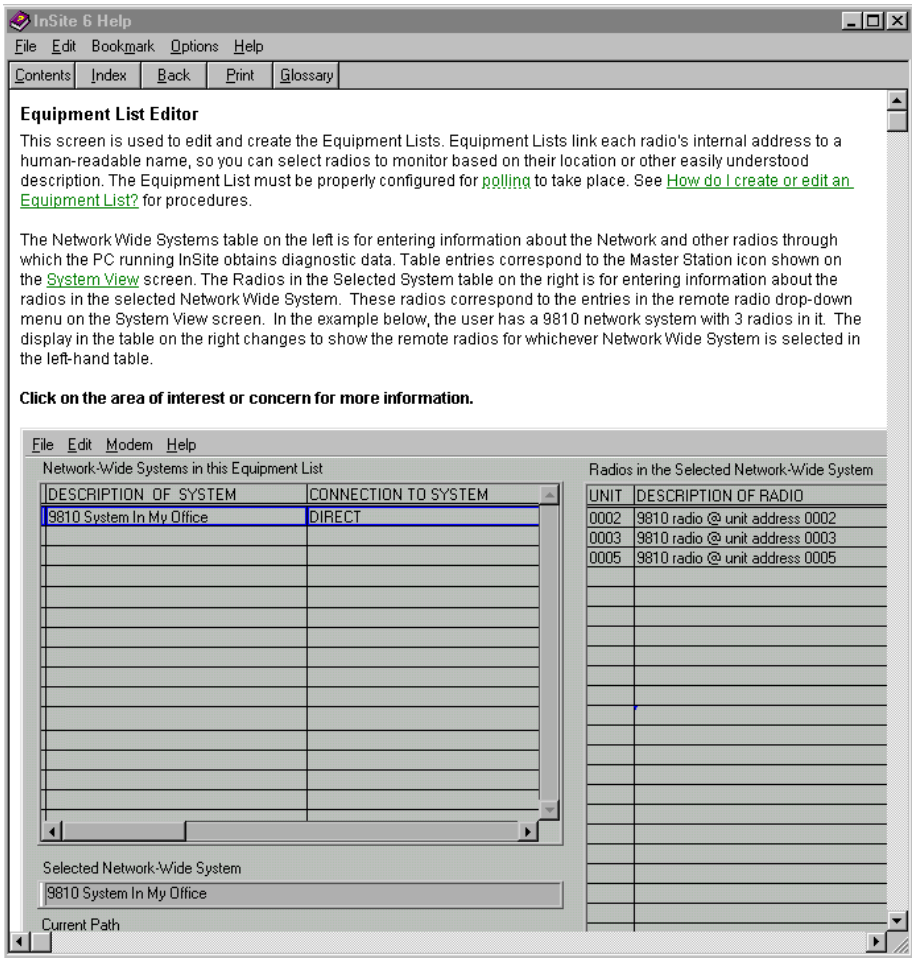

InSite 6 Help
File Edit Bookmark Options Help
Contents Index Back Print Glossary
Equipment List Editor
This screen is used to edit and create the Equipment Lists. Equipment Lists link each radio's internal address to a human-readable name, so you can select radios to monitor based on their location or other easily understood description. The Equipment List must be properly configured for polling to take place. See How do I create or edit an Equipment List? for procedures.
The Network Wide Systems table on the left is for entering information about the Network and other radios through which the PC running InSite obtains diagnostic data. Table entries correspond to the Master Station icon shown on the System View screen. The Radios in the Selected System table on the right is for entering information about the radios in the selected Network Wide System. These radios correspond to the entries in the remote radio drop-down menu on the System View screen. In the example below, the user has a 9810 network system with 3 radios in it. The display in the table on the right changes to show the remote radios for whichever Network Wide System is selected in the left-hand table.
Click on the area of interest or concern for more information.
File Edit Modem Help
Network-Wide Systems in this Equipment List
DESCRIPTION OF SYSTEM
CONNECTION TO SYSTEM
9810 System In My Office
DIRECT
Radios in the Selected Network-Wide System
UNIT
DESCRIPTION OF RADIO
0002
9810 radio @ unit address 0002
0003
9810 radio @ unit address 0003
0005
9810 radio @ unit address 0005
Selected Network-Wide System
9810 System In My Office
Current Path

Figure 11. Example of Online Help

Pop-up Help

Help is available for individual screen items (Figure 12). To display pop-up help, put the mouse cursor on a screen item (button, text entry field, etc.) and click the right mouse button. Choose **Description**.

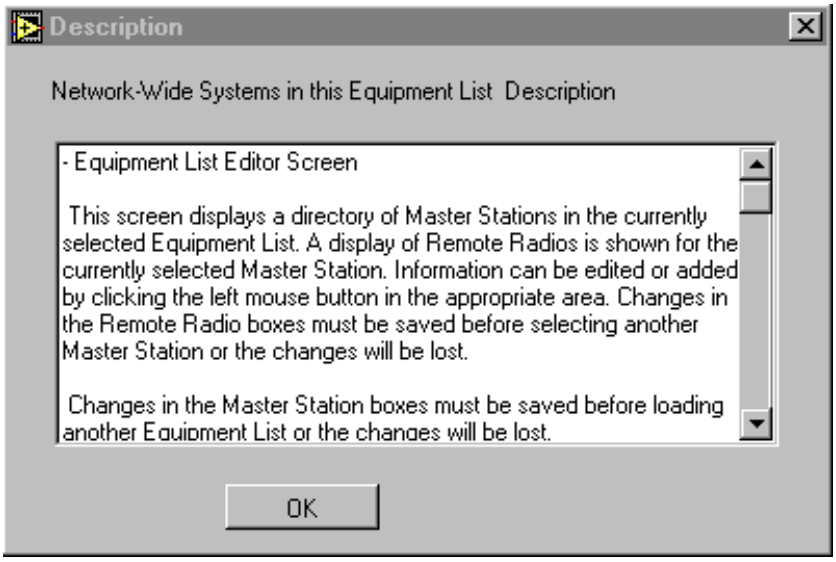

Description
Network-Wide Systems in this Equipment List Description
- Equipment List Editor Screen
This screen displays a directory of Master Stations in the currently selected Equipment List. A display of Remote Radios is shown for the currently selected Master Station. Information can be edited or added by clicking the left mouse button in the appropriate area. Changes in the Remote Radio boxes must be saved before selecting another Master Station or the changes will be lost.
Changes in the Master Station boxes must be saved before loading another Equipment List or the changes will be lost.
OK

Figure 12. Example of Pop-up Window Help

"About InSite" Window

To display: Select **Help>>About** from the Main Menu screen.

This window displays the InSite copyright date, and offers a button for displaying online help. Clicking the **OK** button closes the window. Clicking the blank area between the **OK** and **Help** buttons displays the key authors of the InSite program.

Figure 13. "About InSite" Screen

4.0 NETWORK-WIDE DIAGNOSTICS

MDS network-wide diagnostics is based on a different methodology than traditional DTMF diagnostics. Using network-wide diagnostics, information can be collected from *any* radio in the enterprise without intruding upon payload data flow. Additionally, the radio can be re-configured over the RF link. Information gathering or configuration can be performed from the central site, or from any other radio in the system.

4.1 Diagnostic Data Flow

Figure 14 shows a radio network in which diagnostic data for all the radios in the network is available at the diagnostics computer. Diagnostic data can be gathered passively by attaching messages to normal system polling data (non-intrusive mode) or actively by interrupting the polling data (intrusive mode). Each mode has advantages and disadvantages and these are discussed below.

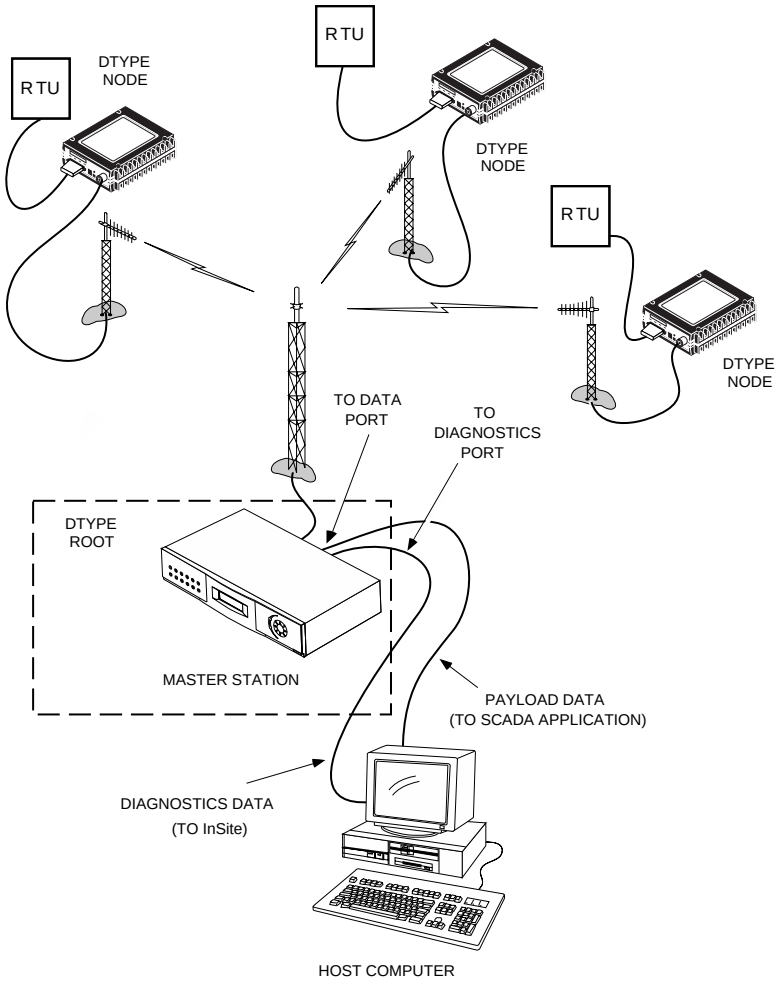


Figure 14. Network-Wide Diagnostics

Intrusive Diagnostics Mode

This mode of operation is inherently intrusive to the system SCADA data. This mode can be operated from any radio site in the system. Diagnostic data is available for any radio in the system. Diagnostic data can be retrieved much faster with intrusive diagnostics than non-intrusive diagnostics because it does not depend on the cycle rate at which the RTU is polled for user data.

During an intrusive poll, the CTS lines are throttled back on every radio in the system to prevent collision between diagnostic data and payload data.

Non-intrusive Diagnostics Mode

This network-wide diagnostics methodology intersperses short packets of diagnostic data with system or "payload data" as part of routine system SCADA polling. As normal system polling occurs, the radio system attaches diagnostic data to the resultant user information, and the diagnostics computer retrieves the diagnostic data. Although this type of messaging is non-intrusive to payload data, it is not as fast as using the Intrusive mode of diagnostics.

Non-intrusive diagnostics can only be accomplished when InSite is running on a computer that is *directly connected* to the root radio in the network.

4.2 Using Network-Wide Diagnostics

This section explains the in-service use of the InSite program with network-wide capable radios.

The screens shown in this section are typical examples; it is possible that they will vary somewhat from those shown on your screen.

Network-Wide Diagnostic Polling Screen

To display: Select **Network-Wide>>Diagnostic Polling** from the Main Menu or NetworkView screens, or click on the remote radio icon in the NetworkView radio selection screen.

This window (Figure 15) displays alarm and diagnostic information for network radios. The information displayed will differ depending on the radio type. When polling a spread spectrum radio, for example, data on each frequency zone (**Zone Data**) is displayed.

When polling a licensed, fixed-frequency radio, this information is replaced by information about the quality of the diagnostic and payload data links (**Performance Data**). Also, some of the button settings (**Show Polling Progress**, for example) retain the last-used setting from one session to another.

Polling data on individual radios can be displayed in table format by clicking on the **View Data** button (once continuous polling has begun, or single polling has finished).

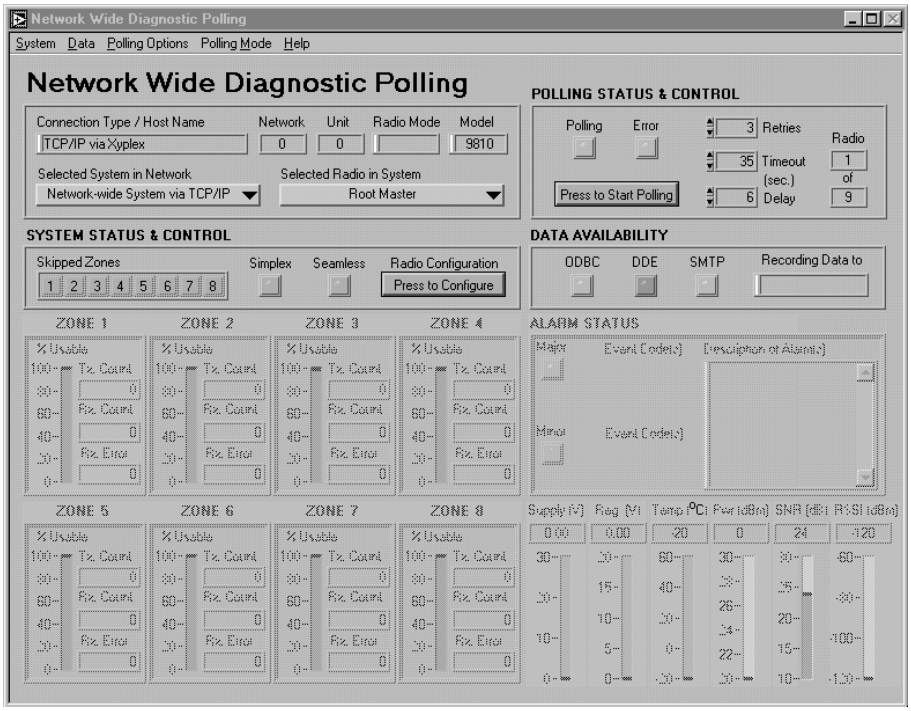


Figure 15. Network-Wide Diagnostic Polling Screen
(Spread Spectrum example shown)

To display polling data:

1. In the top left box, select the radio system from the **Selected System in Network** drop-down menu. This selection is not needed when arriving here from the NetworkView screen.

2. If you want to poll a single radio rather than the entire network or system, select the radio from the **Selected Radio in System** drop-down menu and then set the **Polling Mode** to **Selected Radio Polling.**

3. From the **Polling Options** pull-down menu, select **Show Polling** Progress to display a pop-up window that provides feedback in the form of a progress bar. This indicator is most useful for non-intrusive polls that may take a long time due to a low RTU cycle rate.

4. In the top right box, click on the **Press to Start Polling** button.

Other controls you may need to use are listed in the **Polling Options** drop-down menu: **Polling Mode** (to define the polling method), **Intrusive/Non-Intrusive** (for selecting a polling type), and **Single Poll/Continuous Poll** (to perform polling only once, or to continuously cycle the polling on the selected radio or entire system, depending on the Polling Mode setting).

Table 3. Network-Wide Diagnostic Polling Screen Controls

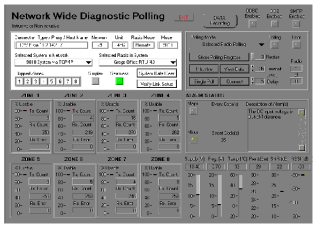
	**Connection Type / Host Name**	This item shows you what is currently specified in the **CONNECTIONS** column of the equipment list. If TCP/IP is specified in the equipment list, an IP address or host name can also be specified.
	Network ***(spread spectrum radios)***	This item indicates the network address programmed in the radio. It applies to spread spectrum radios *only*.
	Unit	This item indicates the unit address programmed in the radio. It is usually the last four digits of the radio's serial number. If a five-digit number is shown, the unit address has been reprogrammed by the customer.
	Radio Mode ***(spread spectrum radios)***	This item indicates the operational mode set in the radio, either master or remote.
	Model	This item indicates the radio model number programmed at the factory. It is used to automatically change the screen display to reflect the radio model's diagnostic attributes.
	Selected System in Network	This is a drop-down menu item of all the systems in the selected equipment list.
	Selected Radio in System	This is a drop-down menu item of all the radios in the selected system. The selected radio from this list will be the radio that is polled if **Polling Mode** is set to **Selected Radio Polling**.
	Skipped Zones ***(spread spectrum radios)***	When clicked, the skipped zones buttons toggle between skipping or not skipping a zone on the spread spectrum radio. At least one zone must be enabled. It may take a few seconds for the button to react after clicking on it, and up to 13 seconds for the radio system to re-synchronize.
	Simplex ***(spread spectrum radios)***	This button sets the radio's simplex command to either on or off. On (green) indicates the radio will transmit and receive on the same frequency. Off (gray) indicates the radio will transmit and receive on different frequencies. To change this setting, the transceiver must be configured as a master rather than a remote radio.

Table 3. Network-Wide Diagnostic Polling Screen Controls *(Continued)*

	Seamless	When this indicator is green, field data is being transmitted in seamless mode rather than quick response mode. This means that field data is gathered and held, then transmitted in a single stream.
	Radio Configuration	This button brings up the Network-Wide Radio Configuration screen where changes can be made to several radio parameters using the diagnostic computer. This screen is described under Radio Configuration (via Network-Wide Diag. Polling Screen) on page 32.
	System Data Clear	This drop-down menu item resets the zone data or performance data, whichever is displayed, and sets the **TX** and **RX Counts** to zero. The percentages are weighted against the total TX and RX counts. Therefore, a small number of errors will be a large percentage of the total RX counts if the counts are cleared with this button.
	Verify Link Setup	Select this menu item to test the connection between the PC and the radio connected to the PC. InSite displays a pop-up window describing the radio and its connections (Figure 16): **Equipment List Setup**–Shows the entry for this radio in the BAUD column of the equipment list. **Radio Setup**–Lists the options installed on this radio in a scrollable box. **Communication Error**–This indicator is red when the PC cannot communicate with the radio, regardless of baud rate. **Setup Conflict**–This indicator is red when a conflict exists between the BAUD rate in the equipment list and the radio's DLINK setting. **Setup is OK**–This indicator is green if the link setup is operating correctly. Click OK to close this display-only window.

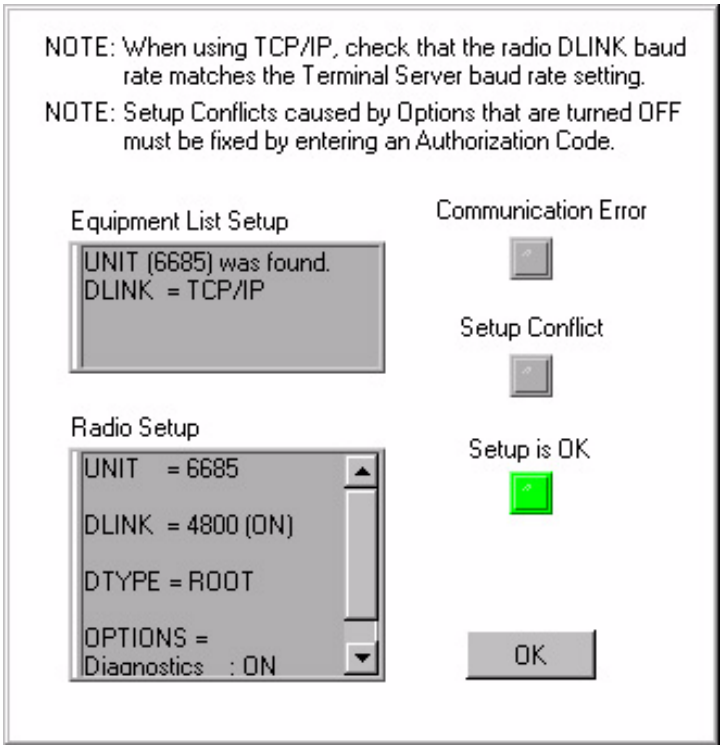

NOTE: When using TCP/IP, check that the radio DLINK baud rate matches the Terminal Server baud rate setting.
NOTE: Setup Conflicts caused by Options that are turned OFF must be fixed by entering an Authorization Code.
Equipment List Setup
UNIT (6685) was found.
DLINK = TCP/IP
Communication Error
Setup Conflict
Radio Setup
UNIT = 6685
DLINK = 4800 (ON)
DTYPE = ROOT
OPTIONS =
Diagnostics : ON
Setup is OK
OK

Figure 16. Verify Link Setup Pop-up Window

Table 3. Network-Wide Diagnostic Polling screen controls *(Continued)*

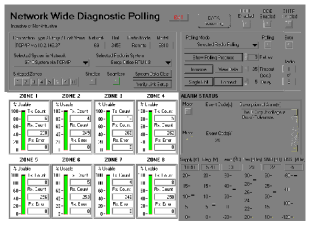
	**Zone Data** ***(spread spectrum radios)***	These displays provide information on frequency zones used by spread spectrum radios such as the MDS x810 Series. The graph shows the usability of each frequency zone in percent. • "100" indicates the zone is perfectly clear and usable. • A number less than 50 indicates the zone is constantly experiencing interference and should be skipped. • **TX count** indicates the number of packets received since the **System Data Clear** button was clicked or the system was brought on the air. • **RX count** indicates the number of packets sent since the **System Data Clear** button was clicked or the system was brought on the air. • **RX error** is the number of packets that have been received as errored packets since the **System Data Clear** button was pressed or the system was brought on the air. If the zone information boxes are grayed, it is an indication that: • The spread spectrum radio has not yet been polled for diagnostics information, or • The zone has been skipped, and the corresponding "skipped zone" indicator is black.

Table 3. Network-Wide Diagnostic Polling screen controls *(Continued)*

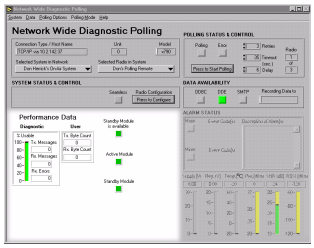
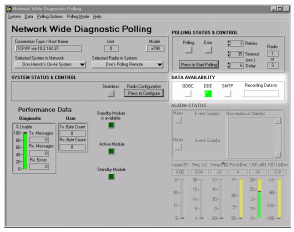
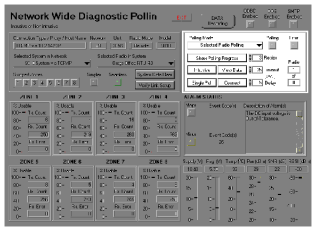
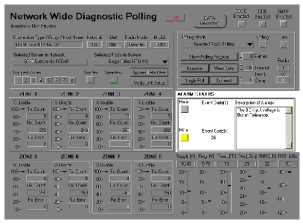
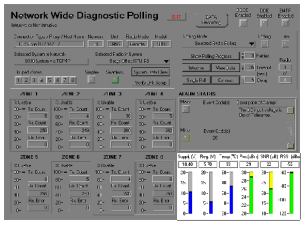
	**Performance Data** ***(non-spread spectrum radios)***	Diagnostic data: • **% Usable** –"100" indicates the frequency is perfectly clear and usable. A number less than 50 indicates the frequency is a weak link, or is experiencing significant interference. • **Tx. Messages**–Number of transmit diagnostic messages sent • **Rx. Messages**–Number of receive diagnostic messages sent • **Rx. Errors**–Number of receive diagnostic messages with an error User (payload) data: • **Tx. Byte Count**–Number of data bytes transmitted • **Rx. Byte Count**–Number of data bytes received
	**ODBC Enabled**	This indicator (when green) indicates that the OBDC connectivity feature is enabled.
	DDE Enabled	This indicator (when green) indicates that the DDE connectivity feature is enabled.
	SMTP Enabled	This indicator (when green) indicates that the SMTP connectivity feature is enabled.
	Recording Data to	The **Data** menu selection opens a Save As dialog box for specifying a file name in which to store diagnostics data.
	**Polling Mode**	This drop-down menu is for selecting the polling mode. The choices are: • Selected Radio Polling • Automatic System Polling • Automatic Network Polling • Scheduled Time Polling **Selected Radio Polling** posts only "good" (non-error) polls to screen displays and DDE/ODBC databases. The other three polling methods post all polls, including errors, to screen displays and DDE/ODBC databases. Examples of error polling responses include a Communications Error (radio is not responding) and an Authorization Fault Error (radio is not equipped with diagnostics capability).

Table 3. Network-Wide Diagnostic Polling screen controls *(Continued)*

	Polling Mode *(Cont'd)...*	**NOTE**: The first entry for network-wide radio systems should be the radio that is connected to the PC running InSite via Direct RS-232, Dial-up Modem, or TCP/IP. This is usually the master radio in a point-to-multipoint system and root diagnostic radio. This first radio entry will always be polled in the automatic polling modes, even if the **POLL** field in the Equipment List reads **NO**.
	Polling *(indicator)*	This indicator is green when the system is being polled for diagnostics information.
	Error *(indicator)*	This indicator is red if an error is encountered in the diagnostic polling process.
	Show Polling Progress	This button enables the pop-up "Polling Progress" window to show the percentage complete.
	Intrusive/ Non-intrusive	This button selects whether or not the polling process uses intrusive or non-intrusive diagnostics (Page 24). Non-intrusive diagnostics must be done through the master station, can be much slower, and is dependent on radio network traffic.
	View Data	This menu selection displays the Network-Wide Diagnostic Data screen (shown on Page 35), which displays diagnostic data for all the radios polled in the system.
	Single Poll/ Continuous Poll	This menu selection toggles between conducting a one-time poll and polling continuously.
	Press to Start Poling	This menu selection toggles between starting and stopping polling.
	Retries	This is the number of times InSite attempts to obtain diagnostics information from a particular radio. Three to five retries is suggested.
	Timeout	This setting specifies how long to wait in seconds for a response from a polled radio. 35 seconds is suggested for most systems.
	Delay	This number indicates the delay between radios in seconds for diagnostic polling to start. The delay can be changed by clicking the up/down arrows on the left side of the box.
	Radio n of n	These boxes indicate which radio is being polled by displaying the relative Remote Radio number in the list. The top number is the relative Remote Radio number; the bottom number is the total number.

Table 3. Network-Wide Diagnostic Polling screen controls *(Continued)*

	**Alarm status**	This area of the screen shows the event codes encountered, if the event is a major or minor alarm, and a description of the encountered alarms and events.
	**Analog Levels**	These bar scales and numerical readouts display the performance of the selected transceiver. **Supply**—Supply voltage. **Reg**—Regulated voltage. **Temp**—Radio's internal temperature in Celsius or Fahrenheit, whichever is set in the System Settings screen. **Pwr**—Forward output power. **SNR**—Signal-to-Noise ratio. The higher the SNR, the higher the quality of the radio signal. **RSSI**—Received Signal Strength Indication. Represents the radio signal strength received at the radio

Sleep Mode Inhibit

InSite 6 has a Sleep Mode Inhibit function that can be used to “wake up” a remote radio that has been placed in sleep mode. Sleep mode is often used at solar-powered sites to keep the current draw of the station to an absolute minimum. At these sites, the radio and RTU are typically powered on for only one second and powered off for nine seconds. This on/off duty cycle provides for efficient power management. Sleep mode is typically asserted at the radio by grounding Pin 12 of its interface connector. (See radio manual for details.)

“Sleep Mode Inhibit” is an InSite feature that temporarily overrides the radio’s sleep status so that diagnostics can be performed on a station that is in sleep mode. At the conclusion of diagnostic polling, the inhibit command is removed, and the radio returns to sleep mode.

Enabling/Disabling Sleep Mode Inhibit

Sleep Mode Inhibit can be enabled or disabled under the **Polling Options** drop-down menu of the Diagnostic Polling screen. Once activated, the user can set an “Initiate Timeout” timer in one-second increments (600 seconds maximum). This sets the duration of the Sleep Mode Inhibit command. The radio stays awake during this time and returns to sleep mode when InSite has finished polling or the maximum time has passed.

The Sleep Mode Inhibit feature can be enabled or disabled by the user at any time.

Radio Configuration (via Network-Wide Diag. Polling Screen)

The **Radio Configuration** button on the Diagnostic Polling Screen brings up the screen shown in Figure 17. From here, changes may be made to radio settings without the need to personally visit the radio site. This can be a timesaving feature, especially when a changes are required to a large number of radios.

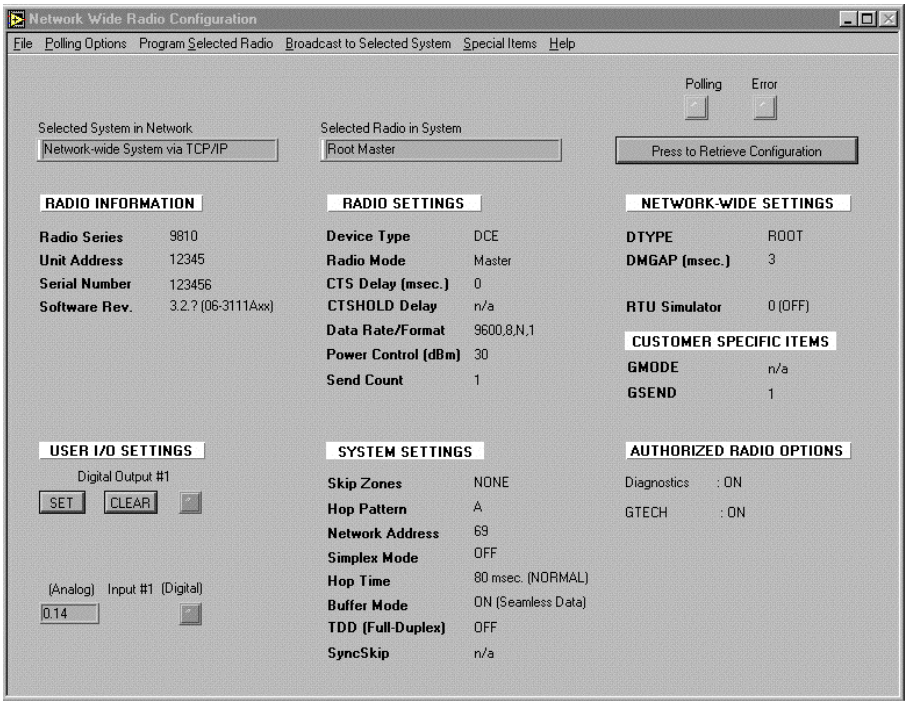


Figure 17. Radio Configuration Screen
(Accessible from the Network-Wide Diagnostics Polling Screen)

NOTE: The Radio Configuration screen is a powerful tool for changing the basic operation of radios in your system. Improperly used, it can cause undesired, or even unlawful operation. To prevent unauthorized access to this screen, it is recommended that Passwords be enabled. For more information, refer to Password Access on page 18).

Table 4 provides a summary of the available selections from the Radio Configuration Screen.

Table 4. Radio Configuration Screen

File>>Send Radio Information to a Text File	This selection sends the currently displayed radio configuration to a text file (.txt).
File>>Print Radio Information	This feature sends a formatted report of the radio configuration settings to a connected printer.
File>>Exit	This selection closes the current screen and returns you to the previous screen.

Table 4. Radio Configuration Screen (Continued)

Polling Options	Allows selection of these polling options: • **Intrusive Polling—**May be used from *any* radio connected to a computer running InSite. Although it does interrupt payload data briefly, this mode is faster than non-intrusive polling. All radio CTS lines are throttled back to hold off the RTU and SCADA host when this selection is made. • **Non-intrusive Polling—**Non-intrusive diagnostics can only be performed from a radio defined as the ROOT station. It intersperses short packets of diagnostic data with regular system data as part of routine SCADA polling. It does not interrupt system data, but it is slower than Intrusive Polling. • **Show/Hide Polling Progress—**These menu selections toggle between showing a small window with the progress of each poll, or hiding it. The window shows both percent of completion and elapsed time (in seconds) for each poll.
Broadcast to Selected System	This menu item allows for sending polling information to *all* radios in the selected system. Available menu selections are: • **Broadcast Radio Password—**This selection broadcasts the radio password. • **Broadcast Buffer Modes ON/OFF—**Broadcasts the radio buffer mode to ON (Seamless) or OFF (fast byte throughput). • **Broadcast Data Rates/Formats—**This selection broadcasts the radio data rate and format (i.e., 9600, 8N1). • **Broadcast CTS Delays—**This selection broadcasts the radio CTS delay in milliseconds. • **Broadcast DMGAPs—**Broadcasts the radio Diagnostic Message Gap (DMGAP). The DMGAP can be set between 0 and 255 ms (3 ms is typical). For 1200 baud payload data, the DMGAP may be set to a higher time, such as 20 ms, to prevent a diagnostic message from being sent after every character of payload data. For passive mode, the DMGAP is used to determine if the payload message is actually finished. • **Broadcast Software RTUs ON/OFF—**Broadcasts the radio software RTU Simulator to either ON or OFF. The RTU Simulator address can range from 1–80 and may be left enabled as long as the polling command sequence is not a subset of the payload data protocol. The InSite CD contains two DOS-based polling programs (POLL.EXE and RSIM) and a Windows®-based polling program (Data LinkWatcher) that can be used to exercise the RTU simulator feature for testing data throughput.

Table 4. Radio Configuration Screen (Continued)

Program Selected Radio	This menu contains a list of programmable parameters for the selected radio. The available selections depend on the MDS radio model. Listed below are all of the possible parameters in the menu. Refer to InSite's online help for a description of a particular item. The radio manual should also be consulted to understand the effect each command will have on radio operation. • Enter Authorization Code • Enter Radio Password • Program Buffer Mode ON/OFF • Program Data Rate/Format • Program Software RTU ON/OFF • Program Software RTU I.D. • Program DMGAP • Program CTS Delay • Program CTSHOLD Delay • Program Device Type • Program Power Control • Program Simplex Mode ON/OFF • Program Hop Time • Program Skip Zones • Program DATAKEY Mode ON/OFF • Program Time Out Timer • Program SCD Delay • Program Selected Module • Program CKEY Mode ON/OFF • Program TDD Mode ON/OFF • Program Network Send Count • Program Local Send Adjust • Program SYNCSKIP ON/OFF • Customer Specific • Alarm Masking
Special Items	NOTE: This menu contains radio configuration items that should be used with caution. If improperly used, they can cause a loss of contact with an associated station over the RF link. To use this item, you must have **Special Remote Menu items** enabled on the System Settings screen. • **Program x810 Network Address—**Allows you to change the network address of MDS x810 radios. • **Program TX/RX Frequency—**Allows you to change the transmit/receive frequency of a radio.
Selected System in Network	This drop-down menu lists radio systems defined in the current equipment list. Select the desired radio system to poll for alarms. Use the tab and arrow keys to navigate through the menu selections.

Table 4. Radio Configuration Screen (Continued)

Selected Radio in System	This drop-down menu lists individual radios in the selected system. Select the desired radio to poll for configuration info. Use the tab and arrow keys to navigate through the menu selections.
Press to Retrieve Configuration	Initiates a poll of the selected radio. There are two indicators above this button; Polling and Error. The Polling indicator glows green during a poll, and the Error indicator glows red if the poll is unsuccessful.
RADIO INFORMATION	Lists basic information about the selected radio such as identification data, software revision and frequency. This information is “read-only.”
RADIO SETTINGS	Lists key programmable settings of the radio. Many of these settings can be changed from InSite over the RF link. Some settings have been omitted to prevent the user from accidentally disabling the radio system. The specific settings that are available will change depending on the radio model. Consult the radio manual for explanations of each command.
NETWORK-WIDE SETTINGS	Lists the Device Type (DTYPE), Diagnostic Message Gap (DMGAP), and the status of the RTU simulator.
USER I/O SETTINGS	Allows you to activate the digital output (#1 or #2) at the radio by clicking either **SET** button. An indicator to the right glows green when the output is set. Clicking the **CLEAR** button deactivates the associated digital output and turns off the indicator.
AUTHORIZED RADIO OPTIONS	Shows the status of optional features that may or may not have been purchased with the radio. Contact the factory for information on optional features.

4.3 Authorizing a Radio for Diagnostics

A radio can be purchased from the factory with or without diagnostics authorized. Alternatively, the radio can be authorized at a later time using the InSite program.

To add diagnostics, an authorization code must first be purchased from MDS. When contacting the factory, the serial number of each radio that you wish to authorize is required. (InSite’s Network-Wide Radio Configuration screen may be used on an unauthorized radio to obtain the radio serial number.)

Once the authorization code is obtained from MDS, the radio can be authorized over-the-air from InSite’s Radio Configuration screen using the **Program Selected Radio>>Enter Authorization Code** menu.

Network-Wide Diagnostic Data Screen

To display: Select **Network-Wide>>Diagnostic Polling** from the Main Menu or NetworkView screens, or click on the remote radio icon in the NetworkView radio selection screen. Then select **View Data** from the **Data** menu.

This window shows diagnostic data for each polled radio in the system or network. Some data is shared between MDS x810 spread spectrum radios and MDS x710/x790 licensed MAS radios (primarily the zone data/performance data items). For more information, see Table 19 on page 78.

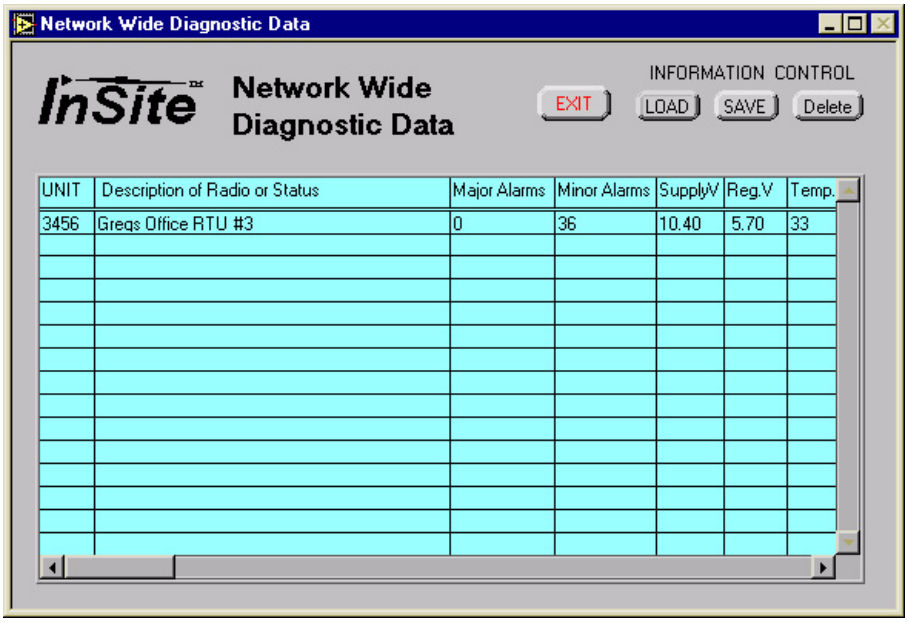


Figure 18. Network-Wide Diagnostic Data Screen

The **INFORMATION CONTROL** buttons let you save the information displayed in the table to a file, and reload previously saved files. The information is saved in an ASCII file with the suffix ***.TXT**. The file may be re-displayed in the Network-Wide Diagnostic Data window, or opened in a word processing, spreadsheet, or database program for editing and printing. Charting and Graphing on page 65 offers suggestions for using the data in this file, such as for creating graphs.

Table 5. Network-Wide Diagnostic Data Screen

EXIT	This selection closes this window and returns you to the Network-Wide Diagnostic Polling screen.
LOAD FILE	Displays the standard Windows® **Open** dialog for selecting a previously saved radio or redundant master station diagnostics. Change to the directory where these files are stored (the default location is the InSite program directory), and select a ***.TXT** file.

Table 5. Network-Wide Diagnostic Data Screen (Continued)

SAVE	Displays the standard Windows® **Save** dialog for specifying a directory and file name prefix. The default directory for saving the files is the InSite program directory, which you may change. Enter a name for the files. A file name suffix of ***.TXT** is automatically added to the file name prefix you specify.
Delete	Clears the information displayed in the Network-Wide Diagnostic Data window.
Table	This table displays diagnostic data from recently polled radios. N/A in a field can stand for either Not Available or Not Applicable. Data which exceeds an enabled ALERT limit is preceded with an (*) asterisk.
UNIT	Radio's unit address. Usually the last four digits of the serial number.
Description of Radio or Status	Name of the radio and its alarm condition, if any.
Major Alarms	Description of any major alarms found at this radio.
Minor Alarms	Description of any minor alarms found at this radio.
SupplyV	Main supply voltage.
RegV	Regulated voltage.
Temp.	Internal radio temperature.
Power	Transmit power level.
SNR	Signal-to-noise ratio (SNR).
RSSI	Received Signal Strength Indication. This value represents the radio signal strength received at the radio.
Zone *n* Tx	Number of frames transmitted in that zone since the counter was reset.
Zone *n* Rx	Number of non-errored frames received in that zone since the counter was reset.
Zone *n* Error	Number of errored frames transmitted in that zone since the counter was reset.
Zone *n*%	Zone availability in percent. It is based on the number of errored frames and non-errored frames.
Skip Zones	Decimal value between 0 and 255. The 8 bit binary equivalent indicates which zones are set to skip. A 0 indicates no zones are skipped.
Error	This value is either a 0 or a 1. A 1 indicates an error condition. A 0 indicates no errors.
Date/Time	Time and date stamp of the diagnostics data listed in the Network Diagnostics table.

Network-Wide Diagnostic Collection Screen

To display: Select **Network-Wide>>Diagnostic Collection** from the Main Menu or NetworkView screens, or click on the system name at the top of the NetworkView radio selection screen.

This screen (Figure 19) displays the status of radios in the selected system, including any major or minor alarms. The panel in the center of the window toggles between displaying a grid of indicators and a table listing and describing individual alarms (click anywhere on the grid to toggle the display). The colors and meanings of the indicators are listed below. The alarm table is shown in Figure 20.

White—Radio did not respond

Green—Radio responded; radio is OK

Yellow—Radio responded; a minor alarm condition is present

Red—Radio responded; a major alarm condition is present

Blue—New radio found that is not on the Equipment List for this radio system

Gray—(unused grid square)

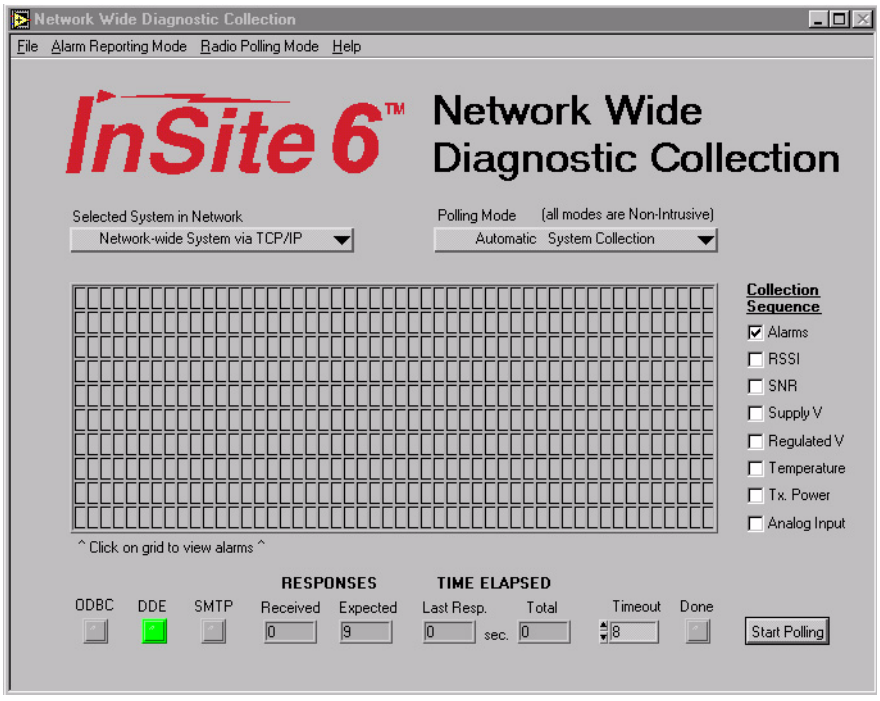


Figure 19. Network-Wide Diagnostic Collection Screen
(Showing indicator grid)

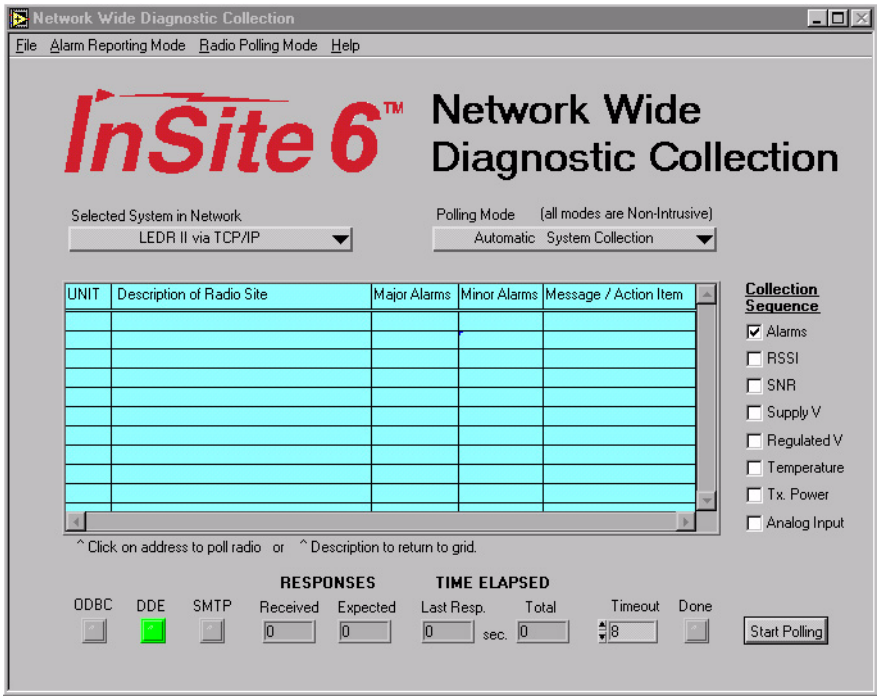


Figure 20. Network-Wide Diagnostic Collection Screen
(Showing alarm collection table)

Table 6. Network-Wide Diagnostic Collection Screen Controls

File>>Exit	This selection returns you to the Main Menu screen.
Alarm Reporting Mode	Provides a choice between showing all alarm poll responses (**Always Respond**), or only those that resulted in an alarm (**Exception Response**). Exception Response is the most efficient choice for systems with heavy payload data, but does not provide feedback in the event a radio goes down (off-air).
Radio Polling Mode	This menu provides a choice between a full diagnostic poll and a simple “ping.” A full poll does a normal poll of the radio(s) including any items checked in the collection sequence. When the poll is finished, the Diagnostic Polling screen appears showing full radio data. An Alarm Status ping is used as a quick check to see if a radio is “alive.” In this mode, a short poll is conducted and alarms, if any, are displayed under the appropriate columns in the Diagnostic Collection table. The **Message/Action Item** column also displays a summary message at the conclusion of a poll. If there is no response, a message box appears stating that the selected radio did not respond.
Help>>Color Key	Opens online help or the color key pop-up window that shows what the colors in the grid indicate.

Table 6. Network-Wide Diagnostic Collection Screen Controls (Continued)

Selected System in Network	This drop-down menu shows all systems in the selected equipment list and allows selecting one for diagnostic polling. The tab and arrow keys may be used to navigate through menu selections.
Polling Mode	This drop-down menu allows selection of the desired polling mode. The choices are: • **Automatic System Collection—**Polls the currently selected Network-Wide System or radio system only once. Radios with **NO** in the **POLL?** field of the Equipment List are skipped. • **Continuous System Collection—**As above, but System Collection runs continuously. • **Automatic Network Collection—**This mode polls the currently selected Network-Wide system and radio system as well as the remotes, only once. Radios with **NO** in the **POLL?** field of the Equipment List are not polled. • **Continuous Network Collection—**As above, but Network Collection runs continuously. • **Scheduled Time Collection—**Choosing this item displays the Scheduled Polling Timer screen for scheduling regular, periodic polls.
Collection Sequence	The Collection Sequence allows you to chose what type of information you would like to retrieve from the radio system during each poll. Simply place a check mark next to the desired parameter(s) and click **Start Polling** to begin. One parameter is collected per poll, thus if four items are checked, four polls are needed to collect the complete data.
ODBC	This indicator (when green) indicates if the OBDC connectivity feature is running. (See Open Database Connectivity (ODBC) on page 73.)
DDE	This indicator (when green) indicates if the DDE connectivity feature is running. (See Dynamic Data Exchange (DDE) Server on page 68.)
SMTP	This indicator (when green) indicates if the SMTP connectivity feature is running. (See E-Mail Notification of Alarms via SMTP on page 62).
Responses	These two items, **Received** and **Expected**, indicate the number of alarm polling responses received and expected based on the response mode, polling mode and equipment list. Newly installed radios, or radios not in the Equipment List, will be detected on this screen.
Time Elapsed	These two items, **Last Response** and **Total**, indicate the time (in seconds) of the Alarm polling response.

Table 6. Network-Wide Diagnostic Collection Screen Controls (Continued)

Timeout	This setting specifies how long to wait (in seconds) for a response from the entire system. A value of 35 seconds is suggested for non-intrusive polling on SCADA systems with a polling cycle of a few seconds. The timeout setting may be set from 1 to 65535 seconds (18 hours). For less frequently polled radios, use the following formula to calculate the proper timeout setting: Timeout Timer (sec.) = System Polling Cycle (sec.) +1 The timeout setting can be changed by selecting the value and typing in the desired value or by clicking the up/down arrows to the left of the number box.
Done	This indicator turns green when the alarm polling process is complete.
Start/Stop Polling	Click on this button to begin polling immediately, instead of waiting for the next scheduled poll. The diagnostic channel is automatically closed after the last radio has been tested.

5.0 LEDR II DIAGNOSTICS AND CONTROL

InSite 6 supports the MDS LEDR II family of radio products (LEDR 400, 900 and 1400 Series). These radios are often used in stand-alone point-to-point links, or as a "backbone" in multiple address radio systems to carry diagnostic data back to a central facility.

5.1 Connecting to LEDR II Radios

Computer connection to a LEDR II radio is made with a 9-pin RS-232 cable connected to the radio's front panel CONSOLE connector (DB-9) as shown in Figure 21. The maximum recommended length for an RS-232 cable is 50 feet/15 meters.

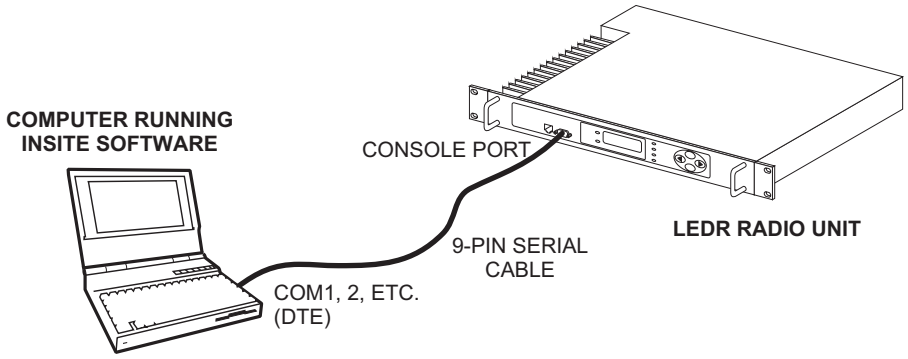


Figure 21. Computer Connection to a LEDR II Series Radio

5.2 Creating an Equipment List for LEDR Radios

NOTE: A review of Section 6.0, *WORKING WITH EQUIPMENT LISTS* (beginning on page 46) is recommended to gain a full understanding of equipment list features.

As with other types of radios, an equipment list is required before InSite can function with LEDR II Series radios. However, only a single entry is needed in the equipment list—in the left-hand table (**Network-Wide Systems in this Equipment List**). Nothing needs to be entered on the right hand table (**Radios in the Selected Network-Wide System**).

A sample equipment list for LEDR radios is built into the InSite program, and can be loaded as follows:

1. From the Equipment List Editor screen, choose **FILE>>NEW.**

2. A dialog box appears with a choice of **Network-Wide System** or **LEDR II**. Select **LEDR II**.

3. An equipment list entry titled **My New System** is established with a direct connection of 9600 baud. (If desired, you can change the system name or other information by typing in new text.)

4. InSite may now be used to communicate with the connected LEDR radio.

5.3 The LEDR II Screen

Only one screen is used to monitor and control LEDR II radios (Figure 23). This screen is accessible from the Network View screen by selecting a LEDR II system under the **Systems in Network** button and clicking on the **Type of System** graphic.

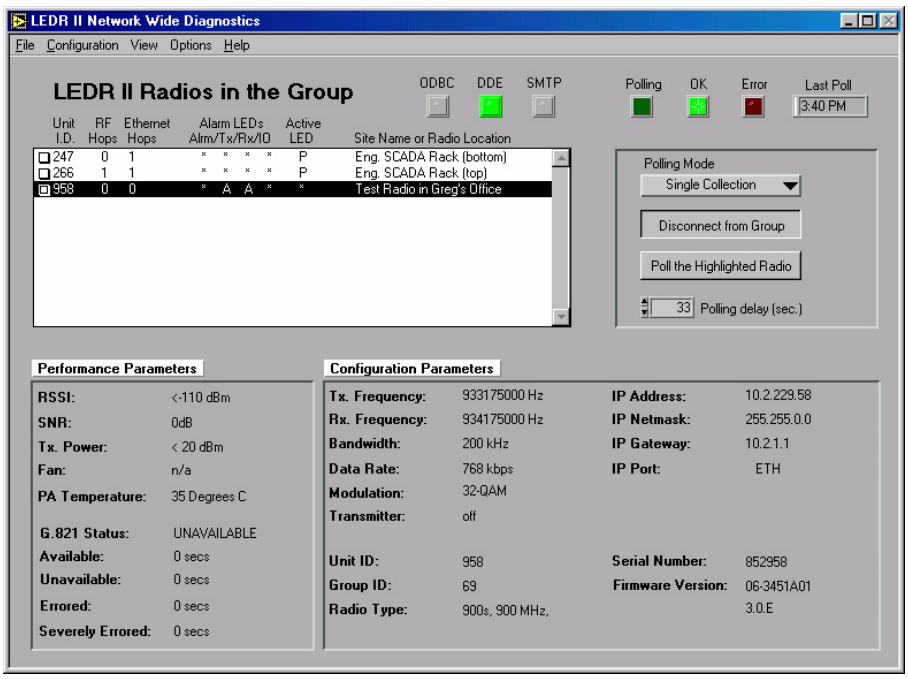

LEDR II Network Wide Diagnostics
File Configuration View Options Help
LEDR II Radios in the Group
ODBC DDE SMTP
Polling OK Error Last Poll
3:40 PM
Unit I.D. RF Hops Ethernet Hops Alarm LEDs Alrm/Tx/Rx/IO Active LED Site Name or Radio Location
247 0 1 P Eng. SCADA Rack (bottom)
266 1 1 P Eng. SCADA Rack (top)
958 0 0 A A Test Radio in Greg's Office
Polling Mode
Single Collection
Disconnect from Group
Poll the Highlighted Radio
33 Polling delay (sec.)
Performance Parameters
RSSI: <-110 dBm
SNR: 0dB
Tx. Power: < 20 dBm
Fan: n/a
PA Temperature: 35 Degrees C
G.821 Status: UNAVAILABLE
Available: 0 secs
Unavailable: 0 secs
Errored: 0 secs
Severely Errored: 0 secs
Configuration Parameters
Tx. Frequency: 933175000 Hz
Rx. Frequency: 934175000 Hz
Bandwidth: 200 kHz
Data Rate: 768 kbps
Modulation: 32-QAM
Transmitter: off
Unit ID: 958
Group ID: 69
Radio Type: 900s, 900 MHz,
IP Address: 10.2.229.58
IP Netmask: 255.255.0.0
IP Gateway: 10.2.1.1
IP Port: ETH
Serial Number: 852958
Firmware Version: 06-3451A01 3.0.E

Figure 22. LEDR II Radio Screen

Unlike other InSite screens, The LEDR screen may be “detached” from the rest of the InSite program. That is, it will remain active and visible during all other InSite operations. It will stay active until closed by the user.

In this manner, alarm information on the entire group of LEDR II radios can be tracked simultaneously while polling MAS radios for either alarms, diagnostics, or configuration parameters.

If InSite has been configured for data sharing with other programs (see Section 7.0, *UTILITIES & SPECIAL INSITE FUNCTIONS* (beginning on page 58), the LEDR screen will continue collecting data and sending it to other applications or databases via DDE, ODBC or SNMP while other program functions are active.

NOTE: The diagnostic computer must be directly connected to the CONSOLE port of one of the radios in a network. From that location you may remotely log into other radios in the network.

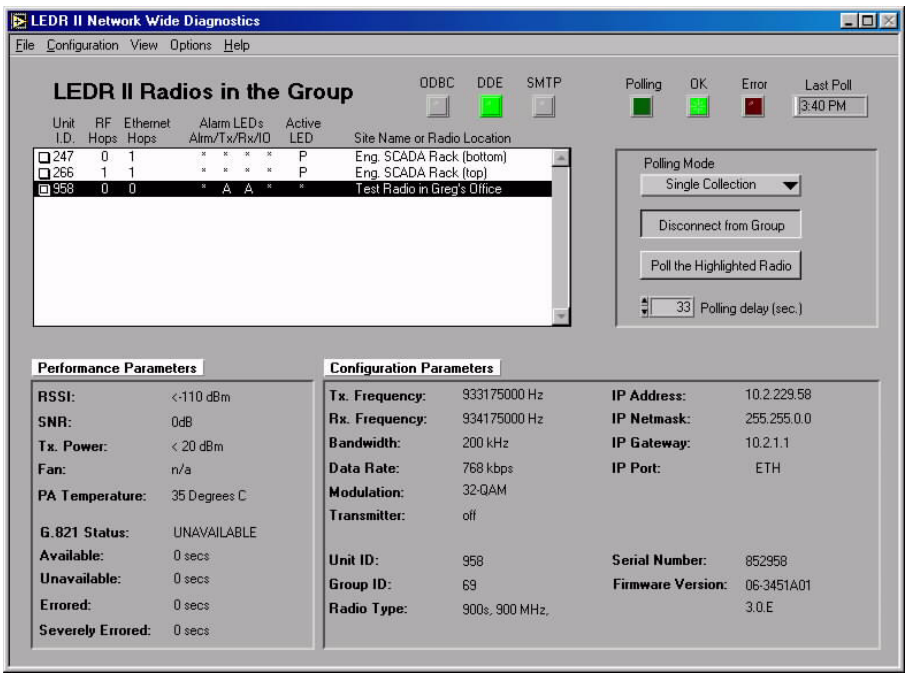


Figure 23. LEDR II Screen

Table 7. LEDR II Screen Controls

File>>Send Radio Information to a Text File	Records the currently displayed radio configuration to a text file.
File>>Print Radio Information	Sends a formatted report of the radio configuration settings to the default printer.
Configuration menu	Presents LEDR II radio configuration parameters as listed below. Many of these parameters may be changed via InSite. Refer to the online help and the LEDR manual for more information on radio settings. • Tx. Frequency • Rx. Frequency • Bandwidth • Data Rate • Modulation • Transmitter • IP Address • IP Netmask • IP Gateway • Unit ID • Radio Type • Serial Number • Firmware
View>>View Levels	This feature shows the trending values in a bar graph format. The following trend levels are shown: RSSI, Temperature, RF Out, SNR, Correctable Blocks, and Uncorrectable Blocks. The values shown are in real time.

Table 7. LEDR II Screen Controls (Continued)

View>>View Alarm Detail	This command shows detailed alarm information for the currently logged-in radio.
Options>>Clear All G.821 fields	This command clears the counts displayed under **Performance Parameters** for the following items: **Available**, **Unavailable**, **Errored**, and **Severely Errored**.
Options>>Sound Buzzer	This will sound the buzzer on the LEDR II radio when an alarm is detected.
Help>>Serial Terminal Mode	Allows you to send LEDR II terminal commands as if you had connected to the LEDR II via a telnet session. See "Terminal Mode" on page 64 for more information. Refer to the radio manual for available LEDR II commands.
Help>>TCP/IP Telnet Window	Starts a telnet session with the connected LEDR II radio.
LEDR II Radios in the Group	This box displays all the radios which you can connect to, are connected to, and logged into. If you are logged into a radio, the small box to the left of the entry will be highlighted. All performance and configuration data listed on the LEDR screen pertains to the logged-in radio. (This can be confirmed by matching the **Unit ID** number of the logged-in radio with the number shown in the Configuration Parameters area.)
ODBC, DDE, SMTP indicator**s**	One of these indicators will light when LEDR II data is being shared with other applications via ODBC, DDE or SMTP.
Polling, OK, Error indicators	The **Polling** indicator glows green when LEDR polling is in progress. The **OK** indicator glows green if all commands were transmitted and received without error. The **Error** indicator glows red if an error occurs during the polling process.
Last Poll	Shows the time that the last LEDR II poll was conducted.
Polling Mode	The LEDR II Polling Mode can be set to Single Collection or Continuous Collection. The **Single Collection** mode updates the screen information only when the user presses the **Poll the Highlighted Radio** button. The **Continuous Collection** mode automates this process every **Polling Delay** interval.
Connect/Disconnect	If you are not connected to a LEDR II radio, this will be the **Connect** button. Press this and a dialog box will appear and prompt you for your user name and password. Once connected, this button will change to **Disconnect**. You may disconnect at any time by pressing the button, or going to the **File** menu and selecting **Exit**.

Table 7. LEDR II Screen Controls (Continued)

Poll the Highlighted Radio	To remotely log into another system, highlight the LEDR II radio that you wish to ”rlog” log into, and click the **Poll the Highlighted Radio** button. The selected radio will then be automatically logged into. You may also double-click the LEDR II radio that you want to log into.
Polling Delay	The LEDR II Polling Delay is enabled when the Polling Mode is set to Continuous Collection. The delay setting is the number of seconds between diagnostic polls. The typical setting is 60 seconds. The range is 5–65000 seconds, or 18 hours.
Performance Parameters	Shows key performance data for the LEDR II radio as listed below. Consult the online help and the radio manual for more information on these parameters. • RSSI • SNR • Tx. Power • Fan • PA Temperatures (°C) • G.821 Status • Available seconds • Unavailable seconds • Errored seconds • Severely Errored seconds
Configuration screen	Shows all radio configuration parameters, many of which can be changed via InSite. See “Configuration” menu items above for a list of the parameters.

6.0 WORKING WITH EQUIPMENT LISTS

To obtain diagnostic data, a PC running InSite connects to a master station or other radio in each system of the network, either directly or via a modem. InSite then polls all the radios in each system through that connected radio.

An **equipment list** provides the connection information that enables InSite to communicate with radios in the field. An equipment list also sets up the icons and drop-down menus on the NetworkView screens, making it possible for users to quickly poll radios without knowing the system or radio configuration. This section explains how to set up an equipment list to meet the needs of your radio system.

NOTE: Equipment lists are the basis for all radio tests performed by the InSite software. No system testing is possible without a properly defined equipment list.

6.1 Equipment List Editor Screen

To display (requires an Administration-level password if passwords are enabled)**:**

- Select **Configure>>Equipment Lists** from the NetworkView or Main Menu screen, or

Figure 24 shows the Equipment List Editor screen with some sample entries.

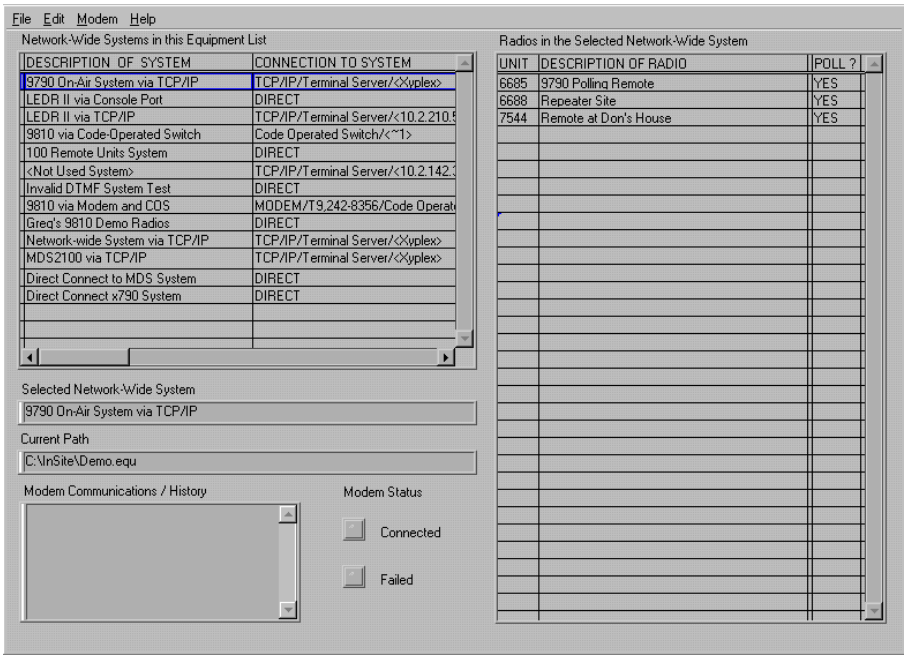


Figure 24. Equipment List Editor Screen

The Equipment List Editor screen has two tables for entering radio information. The table on the left, **Network-Wide Systems in this Equipment List**, is used to enter information about the master stations and other radios that InSite connects to for diagnostic data.

The table on the right, **Radios in the Selected Network-Wide System**, is used to enter information about the remotes and other radios contained in each system. This table changes dynamically, listing the radios for whatever system is selected in the left table.

Figure 25 illustrates how icons and drop-down lists on the NetworkView screen (and, by extension, radios in the actual system) correspond to entries in the Equipment List Editor tables.

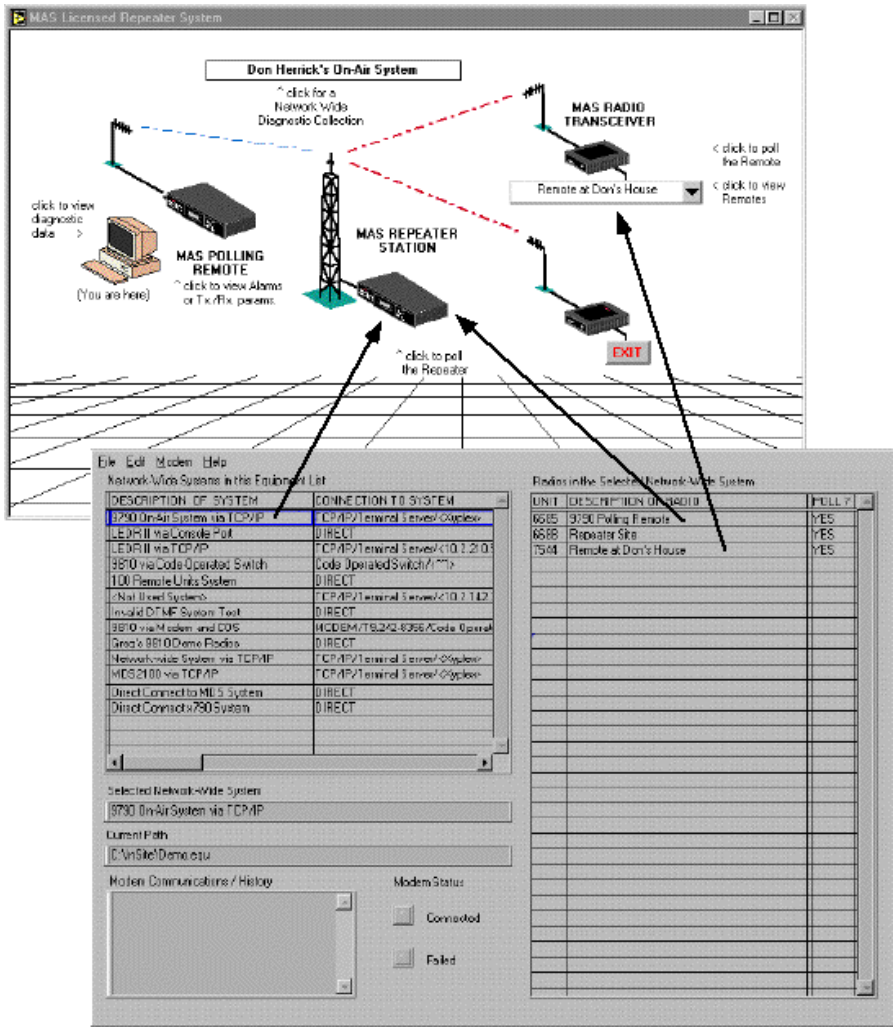


Figure 25. Relationship of Equipment List Tables to Radio System

The System table at the left contains more columns than can be displayed on a single screen. You can display more of the table's columns by clicking the scroll bar at the bottom of the table.

The Radio table at the right has just three cells which are visible at all times. Therefore, no scroll bar is included at the bottom.

NOTE: Equipment lists for network-wide capable radios may be imported from the InSite 5 program. However, these lists contain more than three cells in the Radio (right-hand) table. Since these additional fields are not required in InSite 6, they will not be displayed in InSite 6.

InSite supports up to 256 master stations or connected radios per equipment list, and up to 512 remote radios per master station or connected radio. The program uses one equipment list at a time, but multiple lists may be created to suit different polling requirements. The number of equipment lists is limited only by the available hard-drive space on the computer.

If desired, equipment lists may be created in other applications, such as spreadsheet programs, word processors or imported from existing files; see "Creating and Importing Equipment Lists from Other Applications" on page 57 for more information.

Creating a New Equipment List

InSite simplifies the task of creating an equipment list by presenting a new, built-in list with entries that are suitable for many types of systems. You simply edit the existing information or add new information as required.

Follow the steps below to create a new equipment list. Once you are familiar with the process, you may enter information in any order.

1. Gather information about the Diagnostics PC and all radios in your system as indicated in Table 8. Often, this information can be found on a system diagram or other technical notes that were prepared at the time of installation.

Table 8. Information Needed for Equipment List

Diagnostics PC	Master Station	Remote Radio
Port used for diagnostics communication (1, 2, 3, 4, 5, 6)	Description (installation site or geographic location)	Unit Address
Dial-up modem initialization string, if required	RF route (direct, repeater)	Description (installation site or geographic location)
For network/ Internet-connected PCs: the TCP/IP address number, or the character address specified in the computer's "hosts" file	Diagnostics baud rate (300, 1200, 2400, 4800, 9600, 19200)	
	Dial-up modem initialization string (if used)	
	Non-standby or hot standby configuration?	

2. Display the Equipment List screen by selecting **Configure>>Equipment Lists** from InSite's Main Menu or Network View screen.

3. Select **FILE>>NEW** from the top menu bar.

4. Select the type of system to be created; **Network Wide System** or **LEDR II**. After this selection, a new equipment list appears called **My New System**.

5. On the left table of the equipment list, enter or edit information about all master stations and radios that InSite connects to for diagnostic data. Table 10 on page 54 lists the allowable entries for each cell.

   a. When entering information about each connected radio:

      - Use one row per radio.
      - Fill rows contiguously (no empty rows between completed rows).
      - To type in a cell, click in it and overwrite the existing material.
      - Left-clicking in most cells displays a dialog box with allowable entries.
      - Right-clicking in any cell and selecting **Description...** displays online help for that cell.
      - You may use any combination of upper- and lowercase characters.
      - You can speed entry of information by copying and pasting similar text from one cell or row to another:
        – Use the keyboard keys [**CTRL-C**] (copy) and [**CTRL-V**] (paste), or...
        – Choose Copy and Paste from the cell's pop-up menu (click the right mouse button to display this menu).

   b. Save the equipment list under a new name:

      – Choose **FILE>>SAVE AS**, and enter a new name for the equipment list. Equipment list names can be from one to eight characters long.
      – By default, the list is saved in the InSite folder with a suffix of **.EQU**.

6. Enter or edit information about the remotes and other radios contained in each network-wide system. Table 11 on page 57 lists the allowable entries for each cell.

7. When entering data, follow the guidelines for the left-hand system description table (use one row for each radio, fill rows contiguously, etc.)

   a. The first entry in the table must be the "Root" radio that is connected to the PC running InSite via a direct or modem connection. This is typically the master radio in a point-to-multipoint

system but could be *any* radio that is defined as the diagnostic "Root." Refer to the radio manual for instructions on setting the diagnostic type (**DTYPE**) to "Root."

b. Save the radio information you just entered by clicking on **SAVE**, and then clicking **SAVE** in the dialog window without changing the file name. This creates a file ***xxx*.EQU**, where ***xxx*** is the file name. Each subsequent table created is named **.M01, .M02**, etc.

NOTE: Be sure to click on **Save** before switching from the **Radios in the Selected Network-Wide System** table to the **Network-Wide Systems in the Equipment List** table, or your entries will be lost.

---

c. Repeat the steps above for each network-wide system.

Other Methods of Creating an Equipment List

Using a sample equipment list

Equipment lists may also be created using one of the sample lists built into the InSite program. The following sample lists are included for your convenience:

- **EXAMPLE.EQU** shows typical entries for master and remote radios. New users should view this screen first to become familiar with the overall structure of an equipment list.
- **DEFAULT.EQU** contains a simple configuration to allow direct communication with a master station with a communications port ("Comm") number of 1 and a serial baud rate of 1200. It provides basic functionality for use with most MDS master stations as shipped from the factory.
- **DEMO.EQU** shows entries for all configurations of network-wide diagnostics systems and TCP/IP connectivity.

To view a sample list (or any other equipment list that has been created), click **FILE>>LOAD** on the Equipment List screen. A dialog window displays file names for existing lists. Select the desired list and click **OPEN**.

Unless you specify a different list, **DEFAULT.EQU** will be loaded automatically when you first launch the program. The Default Equipment List can be used as is initially, or it can be used as the basis for a customized list by editing its contents and saving it under a different file name.

With a spreadsheet program or word processor

When creating large equipment lists, you may want to use a spreadsheet program such as Microsoft® Excel or a word processor. The advantage of this method is that you can cut and paste large blocks of text, instead of working on one cell at a time as allowed by InSite's Equipment List Editor. For more information, see Creating and Importing Equipment Lists from Other Applications on page 57.

Saving equipment lists

When saving an existing equipment list under a **new** name, only the group of radios for the *currently selected* system gets saved to disk. Additional radio groups may be copied to the new file name using Windows® Explorer. When copying a radio group, change only the file name prefix (i.e.,**oldname.M02** gets changed to **newname.M02**).

Likewise, changes in the network-wide system cells *must* be saved before loading another equipment list, or the changes will be lost.

Equipment List Features—Detailed Descriptions

Table 9 lists features available on the Equipment List Editor screen. In this table, the name of an on-screen item is shown in bold letters. Click the item to make the selection.

Table 9. Equipment List Editor Features

File>>New	Creates a new equipment list for a Network Wide or LEDR II system. (The type of list created depends on the user's response to a dialog box.)
File>>Load	Displays a dialog window for selecting an existing equipment list file.
File>>Save [Enter]	Saves the currently displayed equipment list to a file. All the master stations will be saved, but only the radios under the *currently selected* master station are saved. Therefore, when creating a new equipment list, the list should be saved *before* selecting a new master station to edit.
File>>Save As	As above, but allows saving the equipment list under a new name, leaving the original file unchanged.
File>>Auto-Generate Equipment List	Opens the Network WIde Radio Search screen, allowing searches for radios in the connected system. Minimum and maximum addresses may be set to limit the search, or up to 10,000 radios can be searched in 30 minutes. Automatic equipment list entries are created for the radios found.
File>>Copy Current Equipment List	Copies the currently displayed equipment list and all associated .mxx sub-files. A dialog box will prompt you for a new file name.
File>>Delete An Equipment List	Allows selection of an equipment list to be removed from the program. Presents a confirmation window to prevent accidental deletion of a desired equipment list.
File>>Print Currently Selected System	Sends the currently selected equipment list to the computer's default printer.

Table 9. Equipment List Editor Features (Continued)

Edit>>Edit Mode	This control enables or disables modem testing of a master station when you select a master station in the table. **Edit**–Modem testing is disabled for creation or editing of an equipment list. Pop-up entry boxes are also disabled. **Editing**–InSite will try to connect via modem to whichever radio is selected in the Network-Wide system table. The modem connection can be tested from the Equipment List, letting you know whether the entered phone number is right and the proper modem initialization string is entered. To disconnect from the master station, or to start a connection at any other time, use the **Force Disconnect** or **Force Redial** buttons. This selection is de-activated when you select **Edit/Editing** again, or exit the Equipment List Editor screen.
Modem>>Force Disconnect	Click this button to hang up the modem connection when the **EDIT/Editing** button is set to **EDIT** (modem testing enabled). Use this button, for example, if a busy signal is received, or to cancel an undesired dial.
Modem>>Force Redial	Click this button to re-initiate a modem connection after cancelling an auto-connect. Use this button, for example, when a busy signal terminates the initial auto-connect.
Help>>On-Line Help	Opens the on-line help screen for the Equipment List Editor screen.
Modem Status Connected/Failed	These indicators show the status of the connection to the selected master station when the **EDIT/Editing** button is set to **EDIT** (modem testing enabled). When the **Connected** indicator is lit, the phone number and modem initialization string provided for the selected master station are correct, and the master station is on line. If the **Failed** indicator is lit, the master station information may be incorrect, the master station may be down (off air), or there may be a problem with the phone line or modem. Check the **Modem Communications/History** text panel (described below) for more information.
Selected Network-Wide System	Displays the name of the currently selected system in the **Network-Wide Systems in this Equipment List** table.
Current Path	Displays the path and file name of the current equipment list. A different equipment list can be displayed by clicking the **File>>Load** button.
Modem Communications/History	Displays an ongoing transcript of modem communications when modem testing is occurring.

Table 9. Equipment List Editor Features (Continued)

File>>Exit	Returns you to the screen you were viewing before invoking the Equipment List Editor. You will be prompted to save the current list.
Pop-up menu (available from any table cell)	Right-click in any table cell to display a pop-up menu with the following commands: **Reinitialize to default**–Resets all table information to default values (clears the table) **Cut data** **Copy data** **Paste data** **Description**–Displays a description of the current item, group or screen **Online Help**–Opens the on-line help file in a new window **Empty Table**–Clears all information entered in the table **Show Selection**–Selecting this menu item toggles the table display between outlining the current cell with a blue line or not. When **Show Selection** is enabled, a check mark appears to the left of this item on the menu.

Network-Wide Systems Table Columns (Left Side)

Table 10 lists information to enter for each network-wide system. Most columns offer pop-up windows with menus or controls for making an entry without having to manually type the information. Selecting an item from the window and clicking OK in the pop-up window closes the window and adds the selection to the current table cell. You may, however, bypass this method and type directly in any cell if desired.

Table 10. Network-Wide Systems Table Columns

DESCRIPTION OF SYSTEM	Use this column to enter a description. The description is frequently the name of the installation site or its geographic location. This description will be used to select the connected radio and will be displayed with the radio's diagnostic data.
CONNECTION TO SYSTEM	Enter the type of connection between the PC running InSite and the connected radio. Double-clicking in a cell in this column displays a drop-down menu with the choices listed below. Selecting a menu item adds that information to the cell; some information can be used as is, and some must be edited. **DIRECT**–PC is directly connected to this radio via an RS-232 cable. **MODEM/T, MODEM/P**–PC connects to this master station via modem using touch-tone or pulse dialing. Enter the phone number of the master station's modem next to the "T" or "P": **MODEM/T1-716-555-1212** Telephone numbers may contain any number of characters and any necessary modem commands. The number string may contain an area code and hyphens (-) for clarity.

Table 10. Network-Wide Systems Table Columns (Continued)

	TCP/IP–PC connects to this master station through a network or through the Internet. Replace the word "address" in angle brackets with the TCP/IP address number (dotted decimal notation) or the character address specified in the computer's "hosts" file: **TCP/IP/Terminal Server/<10.2.142.37>** **TCP/IP/Terminal Server/<Xyplex>** where "Xyplex" is associated with 10.2.142.37 in the computer's "hosts" file. **Code Operated Switch (COS)**–An external device that allows InSite to communicate with multiple radio systems on a common (multi-drop) line. See "Connection via Code-Operated Switch (COS)" on page 2 for details. **LEDR Service Channel**–LEDR radios provide a dedicated rear panel connector (DB-9) for diagnostics labeled "Service Channel." (Refer to the LEDR manual for pinout data.) The service channel can be used to broadcast Network-wide diagnostics from InSite to multiple MAS point-to-multipoint systems.
RF ROUTE	Use this column to indicate the over-the-air path for diagnostics. Double-clicking in this column displays a pop-up window with the following choices: **DIRECT**–Normally used. Allows diagnostics of a master station and its associated remote units. **REPEATER–**Used only in systems using a repeater station to relay remote radio signals to a polling remote.
BAUD	Enter the *diagnostics* baud rate of the connected radio ("300", "1200", "2400", "4800", "9600", or "19200" baud). Double-clicking in this column displays a drop-down menu of baud rates. If a telephone modem is used for diagnostic communications, it must be capable of the same baud rate as the connected radio's diagnostic port. For example, if a connected radio's baud rate is set to 1200 and a 1200/2400 baud modem is used, the InSite baud rate should be set to 1200 and *not* 2400. (1200 bps is the most common setting for MDS radios.) When connecting to the LEDR II radio Console port, the baud rate is always 9600.
POLL?	This column allows you to turn polling on or off for selected systems in automatic polling modes. Double-clicking in this column displays a pop-up window with the choices: **YES**–Include this system during diagnostic polling. **NO**–Exclude this system during diagnostic polling. **CANCEL**–Close the pop-up window without making a choice.

Table 10. Network-Wide Systems Table Columns (Continued)

COMM#	This column indicates the port being used by the computer for diagnostic communications (1, 2, 3, 4, 5 or 6). Double-clicking in this column displays increment/decrement buttons for entering a number, or type the port number directly in the cell. **NOTE:** For TCP/IP connections, the **COMM#** field is used for the TCP/IP port address. The address depends on the remote server access device being used.
MODEM INITIALIZATION STRING	For dial-up modem connections, use this column to enter the modem initialization string. Double-clicking in this column displays a drop-down menu with choices for newer and older modems. The two common strings required are: **AT W2 EØ QØ V1** **AT EØ QØ V1** "W2" in the first modem string is generally required for newer modems, or those with 14.4 kbps or higher capability. If nothing is entered here, the program inserts the second example as a default modem string.
MODEL	Enter the master station's model number, or select it from a drop-down menu by double-clicking in the cell. Available model numbers at the time of publication are: LEDR II MDS x790 Series MDS x710 Series MDS x810 Series
NOTE: Information stored into any of the fields to the right of **MODEL** will be ignored by the program, but will be stored in the equipment list.	

Radios in the Selected Network-Wide System Table Columns (Right Side)

The preceding described entries in the Network-Wide System list columns. The second major activity in building an equipment list is to enter the information for the associated radios used in each system. This information is located on the right-hand side of the equipment list (see Figure 24 on page 47).

Like the left-hand table, most columns of the Radio table offer pop-up windows with menus or controls for making an entry without typing. Table 11 lists the Radio table columns:

Table 11. Remote Station Table Columns

UNIT	This column is used to enter the unit address of system radios. Double-clicking in the cell displays a pop-up window with controls for selecting the unit address. **Unit address**–Uniquely identifies a single radio within a network. As shipped from the factory, the unit address is the last four digits of the radio's serial number. The unit address can be read on a label affixed to the chassis, or displayed using the **UNIT** command from an HHT as described in the radio manual. If you enter a new unit address, it must be five digits long.
DESCRIPTION OF RADIO	The radio description is frequently the name of the installation site or its geographic location.
POLL?	This column allows you to turn polling on or off for selected radios in automatic polling modes. Double-clicking in this column displays a pop-up window with the choices: **YES**–Include this radio during diagnostic polling. **NO**–Exclude this radio during diagnostic polling. **CANCEL**–Close the pop-up window without making a choice.

Defining the Auto-Load Equipment List

InSite will automatically load a selected equipment list when it starts. To define the auto-load list, select **Configure>>System Settings** from the menu bar. Enter the desired path and list in the **Default Path for Equipment List Auto-Load** box. If the currently selected equipment list is the one desired for auto load, click the **Xfer Path** button, then click **EXIT & SAVE.**

Creating and Importing Equipment Lists from Other Applications

Equipment lists, especially large ones, can be created using a word processing or spreadsheet application. They can be saved as a text file, and loaded into InSite. In addition, an existing file, such as output from an inventory program, can be converted to text-only format and loaded into InSite. (A script may need to be created to sort the data into the proper column format. Consult with your computer system administrator for assistance if necessary.)

Simply type or organize the information in the same order as the columns on InSite's Equipment List Editor, separating the information with tabs (word processor) or cells (spreadsheet). Use the sample equipment lists provided with InSite as a guide; you may open them in a word processor or spreadsheet program.

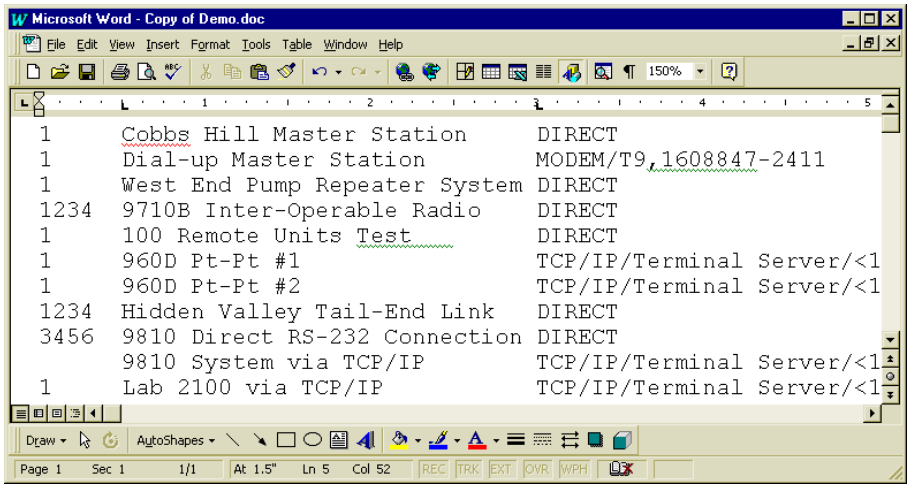

Microsoft Word - Copy of Demo.doc
File Edit View Insert Format Tools Table Window Help
1 Cobbs Hill Master Station DIRECT
1 Dial-up Master Station MODEM/T9,1608847-2411
1 West End Pump Repeater System DIRECT
1234 9710B Inter-Operable Radio DIRECT
1 100 Remote Units Test DIRECT
1 960D Pt-Pt #1 TCP/IP/Terminal Server/<1
1 960D Pt-Pt #2 TCP/IP/Terminal Server/<1
1234 Hidden Valley Tail-End Link DIRECT
3456 9810 Direct RS-232 Connection DIRECT
9810 System via TCP/IP TCP/IP/Terminal Server/<1
1 Lab 2100 via TCP/IP TCP/IP/Terminal Server/<1
Draw AutoShapes
Page 1 Sec 1 1/1 At 1.5" Ln 5 Col 52

Figure 26. An Equipment List Prepared in Microsoft® Word

7.0 UTILITIES & SPECIAL INSITE FUNCTIONS

This section explains how to set or change program defaults, set up e-mail notification of alarm events, and use a troubleshooting tool for debugging communications problems between the computer serial port and the modem or master station.

7.1 Set or Change Program Defaults (System Settings Screen)

To display: Select **Configure>>System Settings** from the Main Menu screen.(Requires an Administration-level password if passwords are enabled.)

The System Settings screen (Figure 27) provides a way for you to change a variety of functions in the InSite program, such as alert sounds, display options, time-out time and password access control. It also allows you to set the criteria for e-mail notification of alarms.

Other than specifying the **Default Path for Equipment List Auto-Load,** it's unlikely that you will need to make any changes to this screen when the program is first installed; the default settings are designed to provide basic functionality with most systems. After you've become familiar with the program, you may wish to change some of these settings to meet special needs.

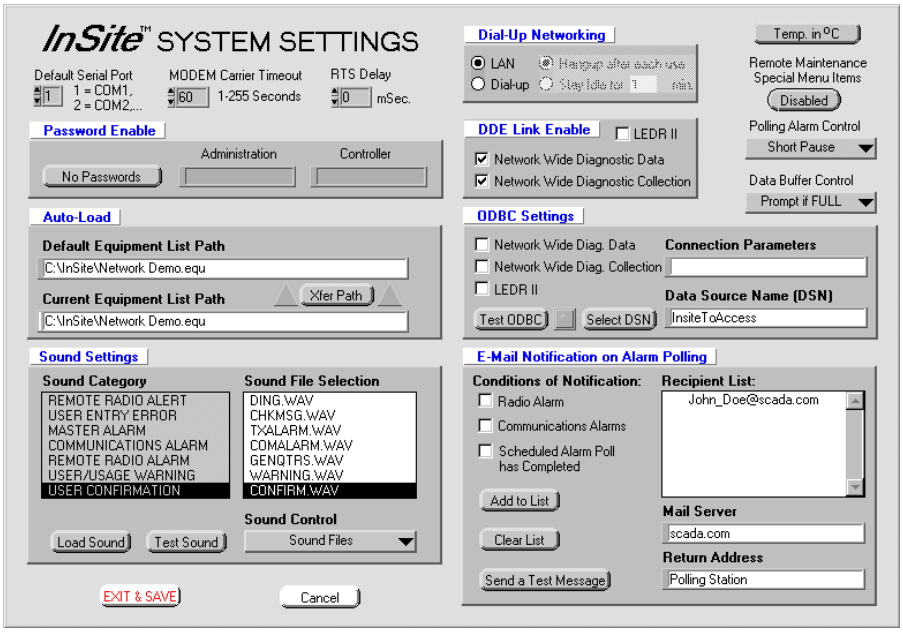


Figure 27. System Settings Screen

Table 12 lists the selections available from the System Settings screen:

Table 12. System Settings Features

Default Serial Port	This control sets the default serial port on the PC that will be used for diagnostic communications. The number displayed indicates the selected communications port (1 = COM1, 2 = COM2, etc.). The highest selectable COM number is 6. NOTE: The default port is used *only* when a port has not been specified in the equipment list.
MODEM Carrier Timeout	This control allows you to set the amount of time to wait (in seconds) before disconnecting from the phone line after a modem carrier dropout. The time can be set from 1 to 255 seconds.
RTS Delay	This control is used to set the amount of time to wait (in milliseconds) between diagnostic polls. It may be set from 0 to 255 Milliseconds; the default setting is zero. When set to zero, this control is disabled (i.e., no delay). A delay can be useful if A/B switches are used on the computer serial port.

Table 12. System Settings Features (Continued)

Passwords Enabled/ No Passwords ***(button)***	Click this button to enable or restrict user access to particular InSite configuration screens. When passwords are enabled, the NetworkView screen is displayed when InSite is first launched, and users are prompted to enter a password if the Equipment List or Systems Settings screens are requested. If passwords are enabled, enter Administration and Controller passwords in the text fields (see "Administration/Controller boxes", below.) When passwords are disabled, InSite displays the Main Menu screen when first launched, all screens are available, and all radio and system configurations can be changed by the user. NOTE: InSite is shipped with passwords disabled and "None" in the Administration/Controller fields. **Administration/Controller** boxes If passwords are enabled, enter passwords for these levels in their respective text boxes. *Password entry is case-sensitive.* Users must type the password with the same upper- and lowercase characters entered in these fields. • **Administration**. Users with an Administration password can access all InSite screens and change all radio and system configurations. • **Controller**. Users with a Controller password can access any screen except the Equipment List and System Settings screens. They can change radio settings on other screens, such as power level and CTS Delay. Users who are not provided with either password can initiate diagnostics and view all but the Equipment List and System Settings screens, but cannot change any settings shown on the screens.
Auto-Load	• **Default Path for Equipment List Auto-Load**—This field defines the path InSite will follow to locate and automatically load the desired equipment list. The program will load InSite's Default Equipment List unless a different one has been specified by the user. • **Current Equipment List Path**—This field displays the currently selected equipment list. • **Xfer Path** —This control allows you to transfer the contents from the **Current Equipment List Path** field to the **Default Path for Equipment List Auto-Load** field. This action records the file location. It does not move it to another directory.
Sound Settings	This screen area allows defining sounds that will occur for specified events. A variety of sounds are supplied with the InSite program. The user may also load a custom sound file. Each area of the *Sound Settings* box is described in detail below. • **Sound Category—** This table lists the events for which InSite normally emits an alert tone or error message. When you select a sound category, the sound file associated with it will be shown selected in the adjoining list to the right under **Sound File Selection** (described below). The computer must be equipped for sound to use this feature.

Table 12. System Settings Features (Continued)

Sound Settings ***(continued)***	• **Sound File Selection—** This table works in conjunction with the **Sound Category** table. It shows the sound file that has been specified for the selected sound category. You can change the selected sound by clicking on a different sound file name. Sounds can be tested by clicking on the **Test Sound** button. • **Load Sound—** When this button is clicked, a dialog box appears allowing you to select a sound file (.WAV format) that will be applied to the currently selected sound category. • **Test Sound—** Produces a sample of the selected alert sound. • **Sound Control—** This drop-down menu allows you to select between three sound settings: No Sound, Simple Beep, or Sound Files.
EXIT & SAVE	Closes the System Settings screen and saves any changes made.
Cancel [Esc]	Closes the System Settings screen without saving any changes.
Dial-Up Networking	Allows selection of LAN or Dial-up connection for TCP/IP communication with the radio system. If dial-up is selected, a time limit may be set whereby InSite disconnects from the Internet after a specified period of no activity. Dial-up Networking is fully described on Page 13.
Temp. in °F/Temp in °C	This control is used to select either Fahrenheit or Celsius temperature displays on the Remote Maintenance and Diagnostic Data Report screens. (Only one or the other temperature scale may be displayed—not both.) Changing the temperature setting affects only newly acquired data. Existing data will be retained in its original form.
Radio Configuration/ Special Menu Items ***(Note: Radio Configuration was called "Remote Maintenance" on previous versions of InSite.)***	This button enables or disables the ability to change the TX/RX frequencies or the Network Address for specific radios. It deserves a security button because changing either of these values can cause a radio to go off line, and if this happens, the only way to restore the settings is at the radio site. Remote Maintenance Special Menu items are described under the Radio Configuration section starting on Page 32.
Polling Alarm Control	This drop-down menu allows you to select what happens when a polling alarm occurs: **Short Pause** after Alarm, or **Wait for Acknowledgment** after alarm. If **Wait for Acknowledgment** is selected, alarm polling will not resume until a detected alarm is acknowledged.
Data Buffer Control	This drop-down menu allows you to select what happens when the data buffer exceeds 62 polls and recording is turned OFF. The choices are: **Prompt if Full**, **Dump if Full** (Delete), and **Save if Full**. Deleted data is erased from the buffer only, not from the hard drive.

Table 12. System Settings Features (Continued)

DDE Link Enable	A check mark in these boxes indicates that the indicated InSite information is made available for DDE linking to other Windows® applications. InSite must be re-launched before DDE changes take effect. Refer to Section 7.4, *Advanced Cross-Program Functions* (beginning on page 65) for additional information on regarding DDE links.
ODBC settings	These settings provide ODBC (open database connectivity) control. • **Check boxes—**The check boxes list InSite screens. Click on a check box to make the diagnostic data displayed on that screen available to a local or remote database. • **Test ODBC—**Clicking this button tests ODBC connectivity to the selected Data Source Name (DSN). The indicator to the right of the button turns green if the test passes. • **Select DSN—**Clicking this button opens a dialog box for selecting a DSN. Double-click on the appropriate DSN to select it. The selection appears in the **Data Source Name** text box. • **Connection Parameters—**This text box is for entering User ID and Password information for network-based databases such as Microsoft® SQL Server. See Section 7.6, *Open Database Connectivity (ODBC)* (beginning on page 73) for additional information.
E-Mail Notification on Alarm Polling	This area of the System Settings screen allows you to activate or deactivate the E-mail notification feature and set a number of related e-mail attributes. Use of this feature is fully described in *E-Mail Notification of Alarms via SMTP* below.

7.2 E-Mail Notification of Alarms via SMTP

A major feature of InSite 6 is automatic e-mail notification of alarm conditions using the Simple Mail Transfer Protocol (SMTP). E-mail messages may also be sent to Internet-capable pagers. The e-mail notification box is located at the lower right hand corner of the System Settings screen (Figure 27). Figure 28 shows a close-up view of this portion of the screen, and Table 10 lists its features.

To display: Select **Configure>>System Settings** from the Main Menu screen. (Requires an Administration-level password if passwords are enabled.)

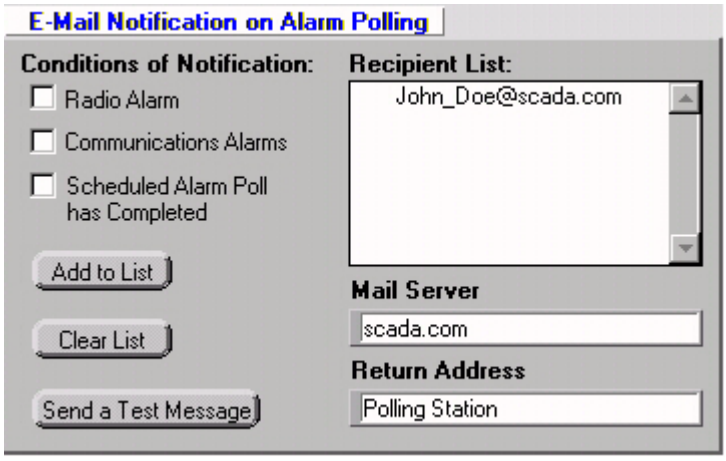


Figure 28. E-mail Notification Box
(Part of System Settings Screen)

Table 13. E-Mail Notification Controls

Conditions for E-Mail Notification	The three check boxes at the upper left corner of the screen are used for selecting the conditions for e-mail notification. The choices are: **Radio Alarm**, **Communications Alarms**, and **Scheduled Alarm Poll has Completed**. One or more of these boxes may be checked as desired. **Radio Alarm**. When this box is checked, the following alarms (or subsequent clearing of these alarms) will result in an e-mail notification:
Network-wide alarms	• Hardware mismatch • Model number not programmed • Authorization fault • Synthesizer out-of-lock • Voltage regulator fault detected • Radio not calibrated • DSP download fault • EEPROM write failure • Checksum fault • Receiver time-out • Unit address not programmed • Data parity error • Configuration error • 6V regulator output not in valid range • DC input power not in valid range • Internal temperature not in valid range **Communications Alarms.** When this box is checked, an e-mail notification will be sent for a failure in the communications link between the diagnostic computer and the master station.

Table 13. E-Mail Notification Controls (Continued)

Conditions for E-Mail Notification *(Cont'd)*	**Scheduled Alarm Poll has Completed.** When this box is checked, an e-mail notification will be sent at the conclusion of each scheduled alarm poll. If no alarm e-mails are received, then the Scheduled Poll completed e-mail serves as a positive acknowledgment that the entire system is free of alarms.
Add to List	When you click this button, a screen appears allowing the entry of e-mail addresses for alarm notification. E-mail addresses can be for a local computer network, or the Internet. Up to 10 addresses may be entered.
Clear List	Clicking this button erases *all* e-mail addresses in the E-Mail Recipients and Addresses box.
Send a Test Message	This button is used to send an e-mail test message to all recipients in the address box. When clicked, each recipient will receive the following message: "This is a Test Message from the InSite Alarm Polling Feature."
Mail Server	A valid mail server address must be entered here. If you do not know the proper server address, see your System Administrator for assistance.
Return Address	The return address can be whatever you wish to call the location where InSite is running. It is used only for the e-mail message "From" field and cannot be used as a return address when replying to the sender. In other words, it is for site description only.

7.3 Terminal Mode

The Terminal Mode Screen (Figure 29) is provided as a troubleshooting tool for debugging serial communications problems between the diagnostic computer and the connected radio. It is accessible from the Main Menu under the **Help** selection. Table 14 explains the functions of the Terminal Mode controls.

The Terminal Mode screen may also be used to issue diagnostic and control commands to MDS radios. A listing of these commands can be found in the radio's instruction manual. The Terminal Mode screen provides a convenient alternative to using a Hand Held Terminal (HHT) to issue radio commands and diagnostic inquiries.

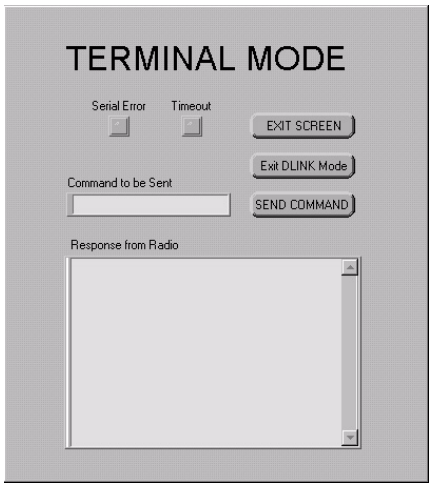


Figure 29. Terminal Mode Screen

Table 14. Terminal Mode Screen Controls

Serial Error	This indicator lights red if an error occurred in any of the serial commands. A pop-up window may appear with information if the serial port fails or does not exist. When the indicator is gray, it indicates no errors were present during the polling operation.
Timeout	This indicator lights red if too much time has passed since the last response from the radio.
EXIT SCREEN	Clicking this button closes the current screen and returns you to the previous screen.
Exit DLINK Mode	Clicking this button exits the DLINK Mode and sets the radio ready for ASCII command data.
Command to be Sent	A text box in which you enter commands to be sent to the radio.
SEND COMMAND	Clicking this button sends the command in the text box (see above description) to the connected radio.
Response from Radio	This area displays a temporary record of commands from the radio. Serial port commands can be investigated with this screen by analyzing the “raw” data in the communications protocol.

7.4 Advanced Cross-Program Functions

Charting and Graphing

Many times, there is a need to show diagnostic data from the radio system in a visual or list format such as a table, chart or graph. This is easily done with InSite data, since all diagnostic reports and equipment list information are stored in a standard ***tab-delimited*** data format. The file names of the stored data are appended with **.REM** for remote radios, **.MAS** for master stations, and **.TXT** for network-wide diagnostics systems.

InSite diagnostic data can be exported to spreadsheets and charting programs such as Microsoft® Graph, Microsoft® Excel, Harvard Graphics®, Lotus 1-2-3 ®, and other software packages. These packages can be used to generate bar graphs, line graphs, pie charts, and a variety of other display formats. Once the InSite information has been entered into the program, it can be displayed and analyzed in any of the methods supported by the program.

It is not our intent to provide detailed instructions here for using these programs. Rather, we give the basic steps for exporting InSite data to these applications and suggest tips for obtaining the desired results. Refer to the user's guide included with your spreadsheet/charting/ graphing software for specific instructions on its use.

Spreadsheets

Standard spreadsheet formats can be used to conduct statistical analysis of InSite data as an aid in managing your radio system and tracking potential troubles. Most spreadsheet programs provide wide flexibility in the way information is presented.

Table 15 shows a typical printout of InSite data that can be obtained using a spreadsheet program, such as Microsoft® Excel. In this example, InSite's Alarm History Information was saved and imported into Excel.

Below are the basic steps required to create this type of table using the Excel program. The procedures for other spreadsheet programs are similar.

1. Launch Excel.
2. Load InSite's **HISTORY.TXT** file into Excel.
3. Select **Format**, then **AutoFormat**.
4. Save the file.
5. Print the result.

Table 15. Typical Spreadsheet Example—*alarm history shown*

History	Station Description	Alarm Reported	Modem Message	Date	Time
New	Cobb's Hill Master Station	Communications Alarm	DIRECT or Same Number	9/1/00	11:03 AM
New	Remote Units Test	Communications Alarm	DIRECT or Same Number	9/1/00	11:05 AM
Gone	Cobb's Hill Master Station	NO Alarms Reported	DIRECT or Same Number	9/1/00	11:10 AM
Gone	Remote Units Test	NO Alarms Reported	DIRECT or Same Number	9/1/00	11:12 AM
Repeat	Greg's Comm. Error Test	Communications Alarm	DIRECT or Same Number	9/1/00	11:15 AM
Repeat	Greg's Comm Error Test	Communications Alarm	DIRECT or Same Number	9/1/00	11:16 AM

Graphing Programs

Graphing provides a visual representation of performance data and is well suited for trend analysis. Deteriorating conditions in the radio system are easily spotted in graph format. Graphs are also useful for doing a "before and after" comparison of performance levels following repairs or adjustments to the radio system.

As an example of graphing, Figure 30 shows a simple line graph that was created using Microsoft® Graph, found within Microsoft® Word. In this graph, a radio's Received Signal Strength Indication (RSSI) is shown over a period of one month. The same technique could be used to show any other diagnostic data such as voltage levels, remote temperature, forward and reflected power levels, deviation levels, and so on.

It is also possible to superimpose data from multiple parameters on a single graph. This may be useful for showing the relationship between two or more different parameters—RF power output and radio temperature, for example.

The specific steps for importing data into a charting or graphing program will be described in the user's manual included with your software. Below are the basic steps required for most programs:

1. Launch the program with charting/graphing capabilities.

2. Import the desired InSite data file into the program (usually as a text/ASCII file).

3. The information in the data file will follow the data field pattern as displayed in the Diagnostic Data Report screen—from left to right, and top to bottom. Remember, InSite creates a separate diagnostic data file for remote radios.

4. Select and name the columns and rows of the data that you wish to graph.

5. Define the type of graph you wish to produce (for example, Line, Bar, Area, etc.).

6. Define the minimum and maximum values on the graph scales, specify the text orientation, font, legend, etc.

7. Invoke the graphing process.

8. After viewing the graph, make any necessary formatting changes.

9. Save the file.

10. Print the file, if desired.

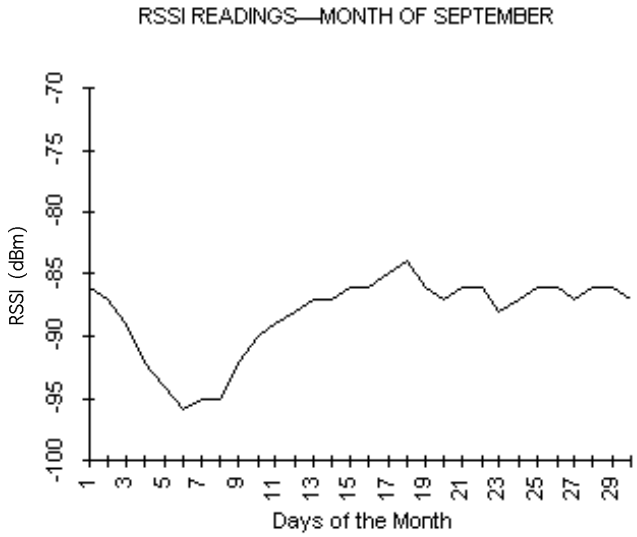


Figure 30. Graphing Example—*RSSI data shown*

7.5 Dynamic Data Exchange (DDE) Server

Dynamic Data Exchange (DDE) is a Windows® feature that allows sharing of data between applications on the same computer. A similar program called NetDDE is used to communicate between *different* computers on the same network.

Both of these programs are included with the Windows® operating system. A requirement to communicate via DDE is that the applications being used support DDE and are running. This section explains how to configure DDE for use with the InSite program.

Microsoft® Excel spreadsheets (.xls files) are furnished with InSite that have the DDE and NetDDE links and layouts to connect to InSite radio diagnostics data. These files are automatically installed with InSite on the application directory (usually **C:\INSITE**).

Table 16. Excel Files for use with InSite DDE and NetDDE

File Name	Description
InSite DDE Alarm=>Diagnostic Collection Data Links.xls	--
InSite DDE Alarm=>Diagnostic Polling Data Links.xls	--
InSite NetDDE Alarm=>Diagnostic Collection Data Links.xls	--
InSite NetDDE Alarm=>Diagnostic Polling Data Links.xls	--
InSite DDE LEDR2 Links.xls	--

How InSite Works with DDE

InSite acts as a DDE server to provide information across the network about whether or not it is currently polling a remote radio for diagnostics. The DDE feature can now be used to determine the entire range of diagnostic parameters retrieved by InSite.

DDE is a client-controlled message-passing protocol. One application, called the “Client”, initiates a conversation and then requests data or sends information to another application, known as the “Server.” For example, assume your application (let’s say Microsoft® Excel) can request a DDE update of a particular item of data from the DDE Server, which in our example is MDS InSite.

Configuring DDE for Use with InSite

To communicate via DDE, you must identify the process you want to “talk to” by specifying the name of a **service** and **topic**, which the server defines.

Service:INSITE

Topic:SYSTEM

A given server normally uses its application name for the service, and can offer several topics to communicate. The server then allows the two applications to reference any number of data **items** under a given topic.

The DDE items listed in Table 17 use the ODBC field name. These are item prefixes that precede every item (or tag) name described in the ODBC section. Refer toTable 18 through Table 20 for individual tag names used *after* the prefix.

Table 17. DDE Data Item Prefix List

Item	Description
SAFE_TO_POLL	0=Safe to poll for payload data; otherwise, it's the master station address being polled for diagnostics (no field name is required)
Alarm_Collection_	Network-wide diagnostic collection data
X9810_	Network-wide diagnostic polling data

In the Client example screen (Figure 31), we've used an Excel spreadsheet to set up two DDE links to separate InSite applications. The first one (in column 2) is running locally on the same computer that is running Excel. To create this DDE link in Excel we use the cell formula:

=INSITE|System!SAFE_TO_POLL

When SAFE_TO_POLL is equals zero (0), it means "safe to poll for payload (system) data." A non-zero value is the address of the Master Station currently being used to poll a remote radio for diagnostics.

The second link in column 3 is using NetDDE to connect with another computer (named GREGC3) on the network also running InSite. To create this NetDDE link in Excel we use the cell formula:

='\\GREGC3\NDDE$'|'INSITE$'!SAFE_TO_POLL

To allow this NetDDE link to work, both the Server and Client computers must be running the program NetDDE.EXE. This program comes with Windows® but does not automatically load. It must be added to the Startup folder so that it will launch automatically when you start Windows®.

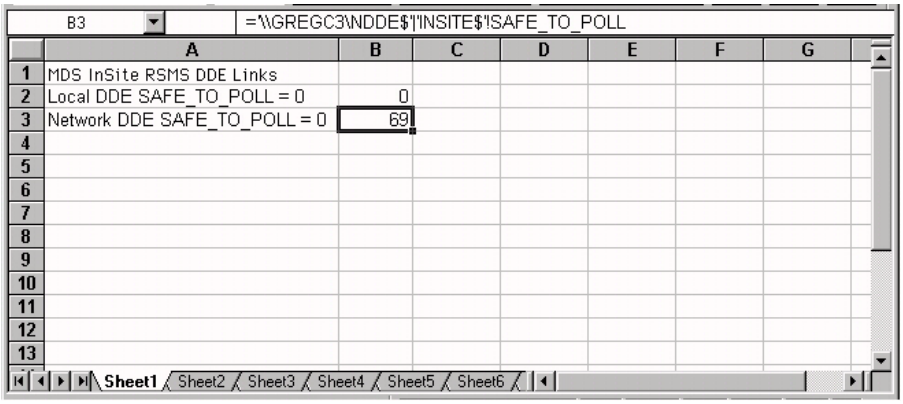


Figure 31. DDE Client Example Using Excel

InSite can be used to simulate the DDE diagnostics link (using master station address 69) by simply going to the About InSite screen from the menu bar. Exiting the About InSite screen will return the DDE value to 0 (Safe to Poll for data). This provides a convenient method for testing the DDE or NetDDE communications.

In addition to running NetDDE, the Server computer must also have a NetDDE share set up. This can be done in two ways.

The first is by using a program called **REGEDIT.EXE** that comes with Windows.

1. Run **\WINDOWS\REGEDIT.EXE**. The Registry Editor screen (Figure 32) will appear.

2. In the tree hierarchy, open the folder:

   My Computer\HKEY_Local_machine\SOFTWARE\Microsoft \NetDDE\DDE Shares

3. Create a new DDE Share by selecting **Edit >> New >> Key** and give it the name **INSITE$**.

4. Use **Edit >> New** to add the required values to the share.

5. Close the **REGEDIT** program.

6. Restart the computer for the changes to take effect.

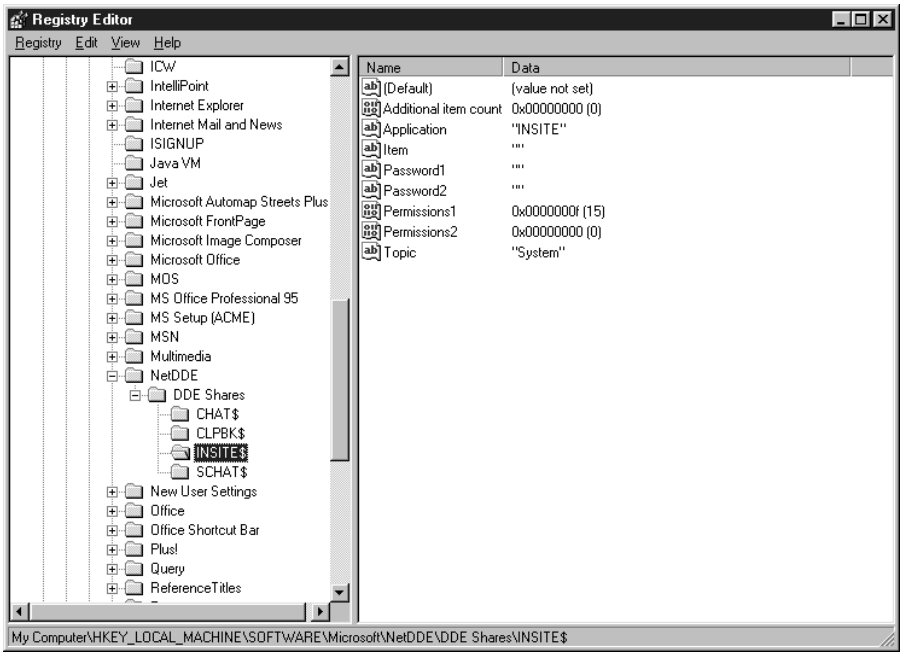


Figure 32. DDE Registry Editor Screen

The second way to establish a NetDDE share set up is by using a program called DDESHARE.EXE that comes with the Windows® Resource Kit. You may find this program easier to use than REGEDIT, but is not supplied with Windows®. To use this program, proceed as follows:

1. Run **\WINDOWS\DDESHARE.EXE**. The DDE Share Manager screen (Figure 33) appears.

2. Select **Share >> New.** The DDE Share Properties screen (Figure 34) appears.

3. Enter the Share Name: **INSITE$**

4. Enter the Application Name: **INSITE**

5. Enter the Topic Name: **System**

6. Click **OK** and then exit the program.

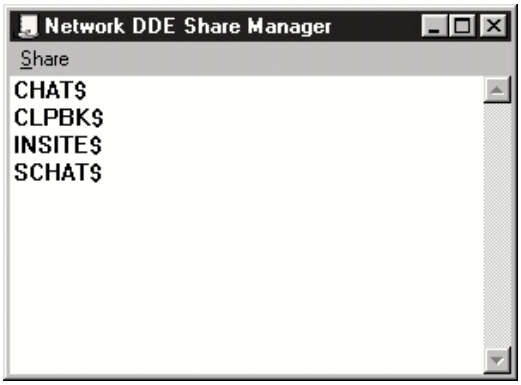


Figure 33. DDE Share Manager Screen

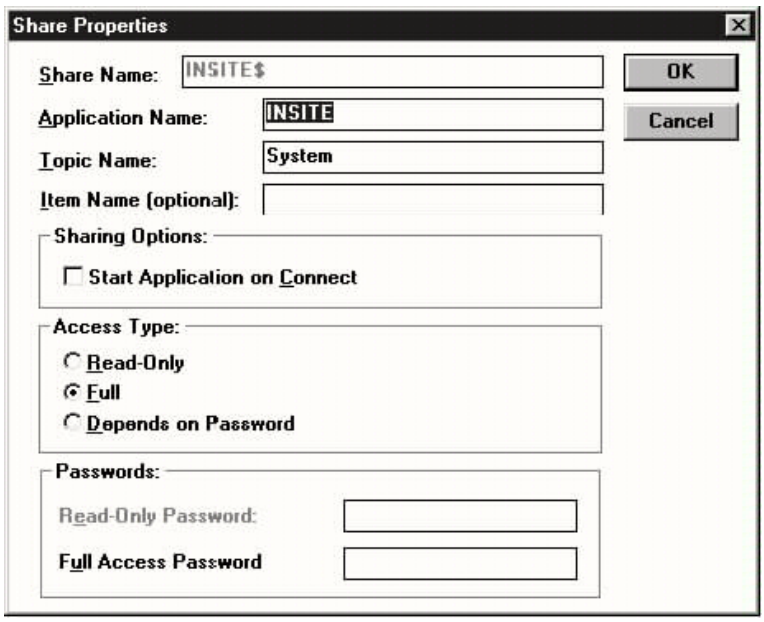


Figure 34. DDE Share Properties Screen

7.6 Open Database Connectivity (ODBC)

InSite adheres to the Windows® OBDC standard to share radio diagnostics data in a separate database application. Using ODBC, the raw radio diagnostics data can be watched in near-real-time from within a third-party database application. Some of the database applications that can be linked to InSite via ODBC are:

- Microsoft Access
- dBase
- FoxBase
- Clipper
- Ingres
- Btreive
- Microsoft SQL Server
- ORACLE 6 or 7
- Paradox
- FoxPro
- Informix
- Gupta
- Microsoft Excel
- Progress

For convenience, a Microsoft® Access database file was placed in the application directory for InSite at the time of installation. The filename is **InSite Diagnostic Data.mdb.** To configure your computer for ODBC data sharing between InSite and Microsoft® Access, follow the steps below. (Other database applications besides Access are set up in a similar manner.)

1. From the Windows® **Start>>Programs** menu launch the **32bit ODBC** application. The Data Sources dialog box appears (Figure 35).

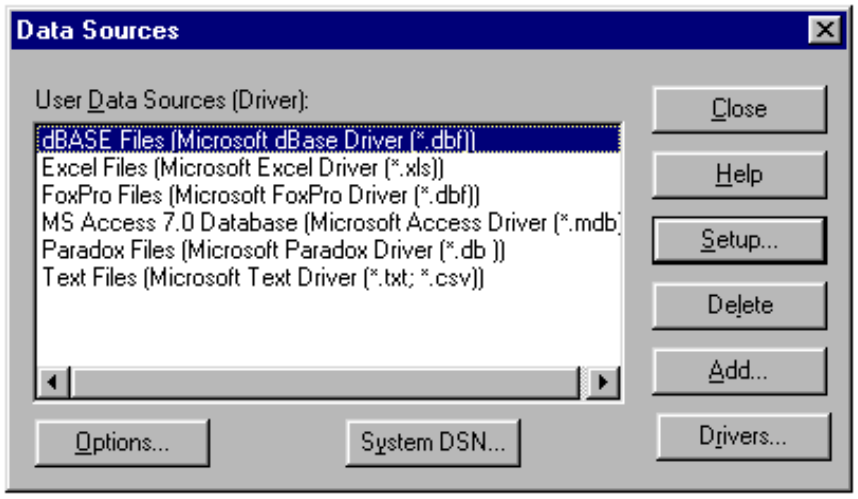


Figure 35. Data Sources Dialog Box

2. Select **Add...**, and the Add Data Source dialog box appears (Figure 36).

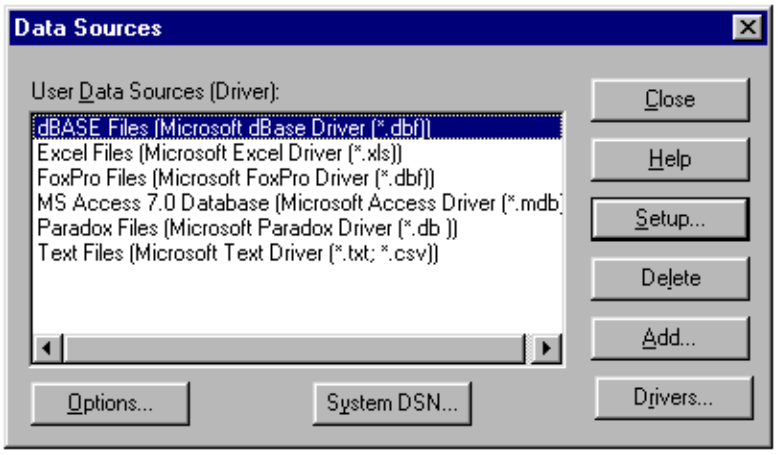


Figure 36. Add Data Source Dialog Box

3. Select Microsoft® Access Driver (***.MDB**).

4. Click **OK**. The ODBC Access Setup dialog appears (Figure 37).

5. Type a new Data Source Name in the **Data Source Name** text box.

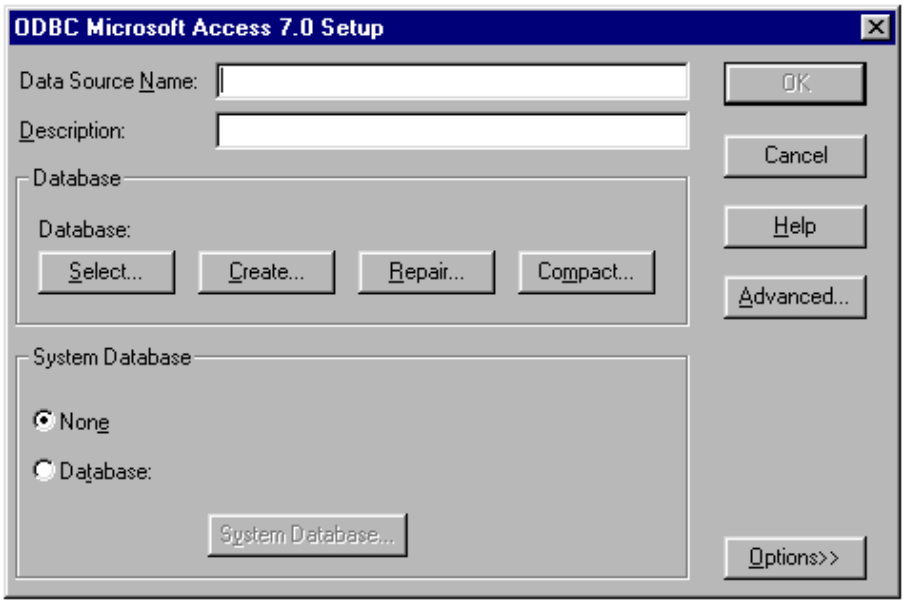


Figure 37. ODBC Microsoft® Access Setup Dialog Box

6. Click on **Select.** A Select Database dialog appears (Figure 38).

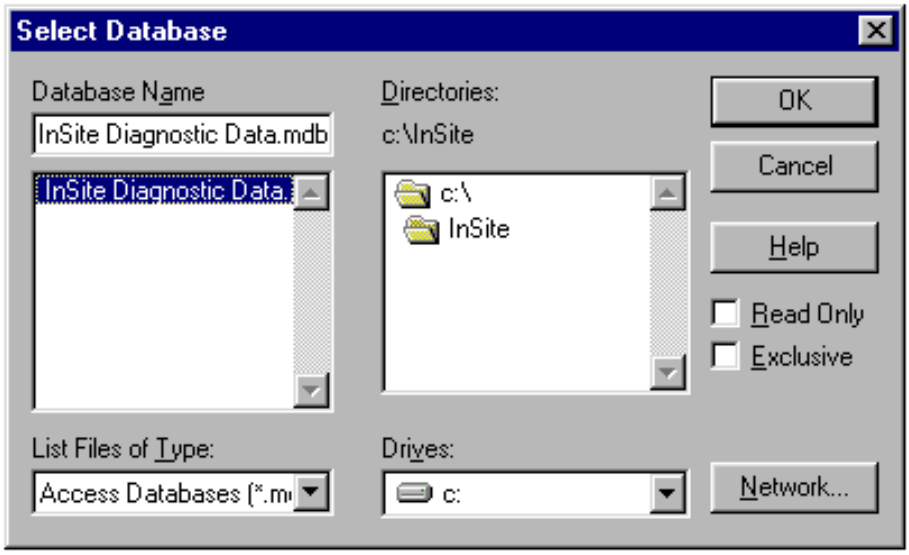


Figure 38. Select Database Dialog Box

7. Locate and load the file named **InSite Diagnostic Data.mdb.** The **InSite Diagnostic Data.mdb** file was installed in the InSite folder at the time InSite was installed.

8. Click **OK**.

9. Again, click **OK** at the ODBC Access Setup Dialog box.

10. Select and highlight the new Data Source Name chosen in Step 4.

11. Click **Close**. The ODBC sharing is now configured.

12. Ensure the ODBC function is enabled on the Systems Settings screen.

ODBC Connectivity Field Names

Table 18 through Table 20 contain the field names and descriptions for ODBC connectivity to InSite. Use the field names provided when configuring the database to use InSite diagnostics data.

NOTE: Some of the field names (primarily those for zone data/performance data) must be shared between MDS x810 spread spectrum radios and MDS x710/x790 licensed MAS radios. These field names are shown in the right-most column in the following tables.

- Table 18—**9810Data** (Network-Wide Diagnostic Polling screen)
- Table 19—**DiagnosticCollectionData** (Network-Wide Diagnostic Collection screen, Page 78)
- Table 20—**LEDR2Data** (Network-Wide Diagnostic Collection screen, Page 78)

Network-wide diagnostic data

Table 18 contains the ODBC field names and descriptions for use in sharing the network-wide diagnostic data in an external database. The information available through these field names is displayed on the Network-Wide Diagnostic Polling screen.

Table 18. ODBC Field Names, Network-Wide Diagnostic Data

NetworkWideData: Table			
Field Name	**Data Type**	**Description**	**x710/x790 Shared Fields**
ID	Auto-number	MS Access automatic record number	--
UNIT	Number	(Long integer) Unit address	--
Description	Text	(50 character) Description of remote radio	--
MajorAlarms	Number	(Long integer) Major alarm code	--
MinorAlarms	Number	(Long integer) Minor alarm code	--
Supply V	Number	(Double) Radio supply voltage	--
RegV	Number	(Double) Radio internal regulated voltage	--
Temp	Number	(Double) Radio internal temperature	--
PowerOut	Number	(Long integer) Power output in dBm	--
SNR	Number	(Long integer) Signal-to-noise ratio	--

Table 18. ODBC Field Names, Network-Wide Diagnostic Data (Continued)

NetworkWideData: Table			
Field Name	**Data Type**	**Description**	**x710/x790 Shared Fields**
RSSI	Number	(Double) Received Signal Strength Indicator	--
Zone1Tx	Number	(Long integer) Zone 1 Tx count	User Tx. Byte Count
Zone1Rx	Number	(Long integer) Zone 1 Rx count	--
Zone1Err	Number	(Long integer) Zone 1 Rx errors	--
Zone2Tx	Number	(Long integer) Zone 2 Tx count	Diag. Tx. Byte Count
Zone2Rx	Number	(Long integer) Zone 2 Rx count	--
Zone2Err	Number	(Long integer) Zone 2 Rx errors	--
Zone3Tx	Number	(Long integer) Zone 3 Tx count	Diag. Tx. Messages
Zone3Rx	Number	(Long integer) Zone 3 Rx count	--
Zone3Err	Number	(Long integer) Zone 3 Rx errors	--
Zone4Tx	Number	(Long integer) Zone 3 Tx count	User Rx. Byte Count
Zone4Rx	Number	(Long integer) Zone 4 Rx count	--
Zone4Err	Number	(Long integer) Zone 4 Rx errors	--
Zone5Tx	Number	(Long integer) Zone 5 Tx count	Diag. Rx. Byte Count
Zone5Rx	Number	(Long integer) Zone 5 Rx count	--
Zone5Err	Number	(Long integer) Zone 5 Rx errors	--
Zone6Tx	Number	(Long integer) Zone 6 Tx count	Diag. Rx. Messages
Zone6Rx	Number	(Long integer) Zone 6 Rx count	--
Zone6Err	Number	(Long integer) Zone 6 Rx errors	--
Zone7Tx	Number	(Long integer) Zone 7 Tx count	Diag. Rx. Errors
Zone7Rx	Number	(Long integer) Zone 7 Rx count	--
Zone7Err	Number	(Long integer) Zone 7 Rx errors	--
Zone8Tx	Number	(Long integer) Zone 8 Tx count	--
Zone8Rx	Number	(Long integer) Zone 8 Rx count	--
Zone8Err	Number	(Long integer) Zone 8 Rx errors	--
Zone1Quality	Number	(Long integer) Zone 1 Usability in percent	Diag. % Usable
Zone2Quality	Number	(Long integer) Zone 2 Usability in percent	--
Zone3Quality	Number	(Long integer) Zone 3 Usability in percent	--
Zone4Quality	Number	(Long integer) Zone 4 Usability in percent	--
Zone5Quality	Number	(Long integer) Zone 5 Usability in percent	--
Zone6Quality	Number	(Long integer) Zone 6 Usability in percent	--

Table 18. ODBC Field Names, Network-Wide Diagnostic Data (Continued)

NetworkWideData: Table			
Field Name	**Data Type**	**Description**	**x710/x790 Shared Fields**
Zone7Quality	Number	(Long integer) Zone 7 Usability in percent	--
Zone8Quality	Number	(Long integer) Zone 8 Usability in percent	--
SkipZones	Number	(Long integer) Zone 1 Tx count	--
Error	Number	(Long integer) Zone 1 Tx count	--
DTstamp	Date/ Time	(Special) Date and time stamp	--

Network-wide Diagnostic Collection Data

Table 19 contains the ODBC fieldnames and descriptions for use in sharing the network-wide diagnostic collection in an external database. The information available through these fieldnames is represented on the Network-Wide Diagnostic Collection screen. Network-wide diagnostic collection data is not stored in InSite's internal database; it is available via DDE or ODBC, or to InSite operators.

Table 19. ODBC Field Names, Network-Wide Diagnostic Collection Data

DiagnosticCollectionData: Table		
Field Name	**Data Type**	**Description**
ID	Autonumber	(Long integer) Database Record Number
UNIT	Text	(Long integer) UNIT Address
Description	Text	(50 Characters) Description of radio
MajorAlarms	Number	(Long integer) Major alarms 0–65535
MinorAlarms	Number	(Long integer) Minor alarms 0–65535
DTstamp	Date/Time	(Special) Date and time stamp
RSSI	Number	(Double) Radio RSSI
SNR	Number	(Long Integer) Radio SNR
SupplyV	Number	Radio Supply Voltage
RegV	Number	(Double) Radio Regulated Voltage
Temperature	Number	(Double) Radio Temperature
TxPwr	Number	(Long Integer) Radio Transmitter RF Output in dBm
Anolog1Input	Number	(Double) Radio Analog Input Voltage (9810 Pin 24)

LEDR2 Data

Table 20 contains the ODBC fieldnames and descriptions for use in sharing diagnostic information for LEDR II Radios manufactured by MDS (i.e., LEDR 400, 900, 1400 Series). The information available through these fieldnames is represented on the LEDR II Diagnostic Collection screen.

Table 20. ODBC Field Names, LEDR2 Radio Diagnostic Data

LEDR2: Table		
Field Name	**Data Type**	**Description**
ID	Autonumber	(Long integer) Database Record Number
AlamedUnitID	Number	(Long integer) LEDR UNIT ID
AlarmedLocation	Text	(50 Characters) Location Description of alarmed radio
LED_Status	Text	(50 characters) Text breakout of front panel LEDs (Alrm Tx, Rx, IO, Active)
LED_Value	Number	(Long Integer) Integer value of front panel LEDs (LEDstatus command)
DTstamp	Date/Time	(Special) Date and time stamp

8.0 GLOSSARY OF TERMS

The following glossary explains many of the terms associated with radio diagnostics, and should prove helpful in understanding network-wide diagnostics operation.

Active Messaging—See *Intrusive Diagnostics*.

Analog—Signals with a continuously varying amplitude, such as the human voice.

bps—Bits-per-second. A measure of the information transfer rate of digital data across a communication channel.

BER—Bit-error rate. See also BERT

BERT—Bit-error rate test. The results of a BERT are normally expressed as a ratio (power of 10) of the number of bits received in error compared to the total number received.

Bit—Binary digit. The smallest unit of digital data, often represented by a one or a zero. Eight bits usually comprise a byte.

Bits per second—See *bps*.

Byte—A digital “word” usually made up of eight bits.

dBm—Decibels relative to one milliwatt. An absolute unit used to measure signal power, as in transmitter power output or received signal strength.

DCE—Data (circuit terminating) Communications Equipment. In data communications terminology, this is the "modem" side of a computer-to-modem connection. MDS radios are normally configured as DCE devices designed to connect to a DTE device.

Decibel (dB)—A measure of the ratio between two signal levels. Frequently used to express the gain or loss of a system.

Digital Signal Processing—See *DSP*.

DSP—Digital Signal Processing. A processing technique that uses software algorithms to filter, shape, or otherwise modify the characteristics of a given signal.

DTE—Data Terminal Equipment. In data communications terminology, this is the computer side of a computer-to-modem connection. (Connects to the DCE device).

DTMF Diagnostics—This is a form of remote diagnostics used by early MDS radios such as the MDS 2310 and 4310. Tones communicate diagnostics information between radios in a network. It disables *SCADA* data flow during diagnostic polling. DTMF radios are *not* compatible with network-wide diagnostics, however, the InSite 6 CD contains earlier versions of the diagnostic program that do support DTMF signaling.

Frame—A segment of data that adheres to a specific data protocol and contains definite start and end points. It provides a method of synchronizing transmissions.

Frequency Hopping—The spread spectrum technique used by MDS x810 transceivers, where two or more associated radios change their operating frequencies several times per second using a set pattern. Since the pattern appears to jump around, it is said to "hop" from one frequency to another.

Frequency Zone—MDS spread spectrum transceivers use up to 1,019 discrete channels in their operating band. A group of 128 channels is referred to as a zone. The transceivers use eight frequency zones. (Five channels are reserved for network control purposes.)

Host Computer—The computer or *PLC* installed at the master station site which controls the collection of data from one or more remote sites.

Intrusive Diagnostics— A mode of remote diagnostics that queries and commands radios in a network which has an impact on the delivery of the system *payload data*. This mode of diagnostics is much faster than the *Non-Intrusive Diagnostics* mode. It is sometimes referred to as "Active Messaging" and is the opposite of *Non-Intrusive Diagnostics*.

MAS—Multiple Address System. A radio system where a central master station communicates with several remote stations for the purpose of gathering telemetry data.

Master (Station)—Radio which is connected to the host computer. It is the point at which polling enters the network.

Network-wide Diagnostics—An advanced method of controlling and interrogating MDS radios in a radio network. It works by interspersing diagnostic data with payload data, as compared to sending DTMF tones, as was used by earlier versions of InSite.

Non-Intrusive Diagnostics—This is a mode of network-wide diagnostics that queries and commands radios in a network without halting system *payload data*. Diagnostic data is collected non-intrusively over a period of time by being interspersed with *SCADA* system data. It is sometimes referred to as "Passive Messaging" and is the opposite of *Intrusive Diagnostics*.

Passive Messaging—See *Non-Intrusive Diagnostics*.

Payload Data—This is the application's user communication data which is sent over the radio network. It is the primary purpose for the radio communications.

PLC—Programmable Logic Controller. A dedicated microprocessor configured for a specific application, with discrete inputs and outputs. It can serve as a host or as an *RTU*.

Poll—A request for data issued from the host computer (or master *PLC*) to a remote radio.

Polling Remote— In point-to-multipoint point radio networks, the polling remote is the radio that connects to the *SCADA* host and makes direct radio contact the repeater.

Radio Network—The complete set of radios through which a single polling scheme can operate. The radio network defines the scope of units that can be addressed through a single *Remote Diagnostics* connection.

Radio Sub-Network— A set of radios that communicate using the same frequency plan (either fixed frequency or frequency hopping). The radio network is composed of one or more radio sub-networks.

Redundant Operation—A station arrangement where two transceivers and two power supplies are available for operation, with automatic switchover in case of a failure. Sometimes referred to as “protected” operation.

Remote Diagnostics—A diagnostics system that allows the interrogation and configuration of a radio at a distant site.

Remote (Station)—A radio in a spread spectrum network that communicates with an associated master station. Many radios may be programmed for either Master or Remote mode using software commands.

Remote Terminal Unit—See *RTU*.

Repeater— In point-to-multipoint point radio networks, the repeater is the radio that makes direct radio contact with the remote radios.

RSSI—Received Signal Strength Indication. Expressed in dBm.

RTU—Remote Terminal Unit. A data collection device installed at a remote radio site.

SCADA—Supervisory Control And Data Acquisition. An overall term for the functions commonly provided through an *MAS* radio system.

SNMP—Simple Network Management Protocol. A common network management system (NMS) protocol used to monitor and control a communications network.

SNR—Signal-to-noise ratio. Expressed in decibels (dB).

SWR—Standing Wave Ratio. A parameter related to the ratio between forward transmitter power and the reflected power from the antenna system. As a general guideline, reflected power should not exceed 10% of the forward power (≈2:1 SWR).

Unit Address—A value used to identify a specific radio in a radio network. The unit address can range from 0 to 65000, and can be changed to a five-digit number ranging from 10000 to 65000 using the **UNIT** command. Radios are shipped from the factory with a unit address matching the last four digits of the radio’s serial number.

Zone—See *Frequency Zone*

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IN CASE OF DIFFICULTY...

If you have problems, comments or questions pertaining to the InSite program, please contact MDS using the information below, or send an e-mail message to:
insite.support@microwavedata.com

FACTORY TECHNICAL ASSISTANCE

Technical assistance for MDS products is available from our Customer Support Team during business hours (8:00 A.M.–5:30 P.M. Eastern Time). When calling, please give the complete model number of the product, along with a description of the trouble symptom(s) that you are experiencing. In many cases, problems can be resolved over the telephone, without the need for returning the product to the factory.

Please use the following telephone numbers for product assistance:

716-242-9600 (Phone)

716-242-9620 (FAX)

If it becomes necessary to return a product to the factory, please use the following mailing address:

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